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# Chapter 1: Introduction

This guide describes the operation of the ENCOM PULSE Link radio configuration utility. ENCOM PULSE Link is a Microsoft Windows based application that is used to set up networks of ENCOM 900 MHz serial and FSK radios.

With ENCOM PULSE Link, you can:

- Configure your ENCOM 900 MHz radios using a friendly user interface
- Optimize the performance of your 900 MHz wireless network
- Diagnose network and communication issues

This guide contains instructions, suggestions and information that will help you set up your radios and achieve optimal performance of your equipment.

## Compatible ENCOM Radios

The following ENCOM radios are compatible with the ENCOM PULSE Link software:

| ENCOM 900 MHz Serial Radios | |
|---|---|
| **Radio Model** | **Description** |
| iPULSE R | 900 MHz rack mount serial radio with Ethernet interface |
| iPULSE S | 900 MHz shelf mount serial radio with Ethernet interface |
| PULSE 2070 | 900MHz 2070 style radio |
| PULSE C | 900MHz shelf mount FSK radio |
| PULSE CR | 900MHz rack mount FSK radio |
| PULSE S | 900MHz shelf mount serial radio |
| PULSE SR | 900MHz rack mount serial radio |
| 5000 series adapter card | PULSE adapter card for 5000 series radios (5100R, 5100S, 5170, 5171, 5200R, 5200S, 5270) |


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# Chapter 2: Installation

## System Requirements

ENCOM PULSE Link was created to run on a wide variety of computers, from netbooks that can be used by field personnel to high-powered, multi-monitor workstations used in the network operations center.

In order to run ENCOM PULSE Link, your computer must meet the following minimum requirements:

- Windows XP SP3, Vista, Windows 7 or Windows 8 operating system
- Microsoft .NET Framework 4
- 2 GB RAM
- 1 GB free hard drive space
- Video card with a minimum 1024 x 720 resolution

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## Downloading the PULSE Link Software

ENCOM PULSE Link is available for download from the ENCOM Wireless website. To download ENCOM PULSE Link:

1. Using a web browser, go to the *ENCOM Software Download Registration* page on the ENCOM web site at:
   - http://www.encomwireless.com/downloads/software
2. Enter the requested information, and make sure that you select **Pulse Link** in the **Software Required** field. Then click on the **Send** button.
3. A confirmation email will be sent to the email address you entered in the registration page.
4. Follow the instructions in the email you received to download the ENCOM PULSE Link setup program to your computer.

If you have trouble downloading or installing PULSE Link, please contact ENCOM technical support, using any of the following options:

- Email: support@encomwireless.com
- Phone: 1-800-617-3487 (ext. 223)
  1-972-885-5170

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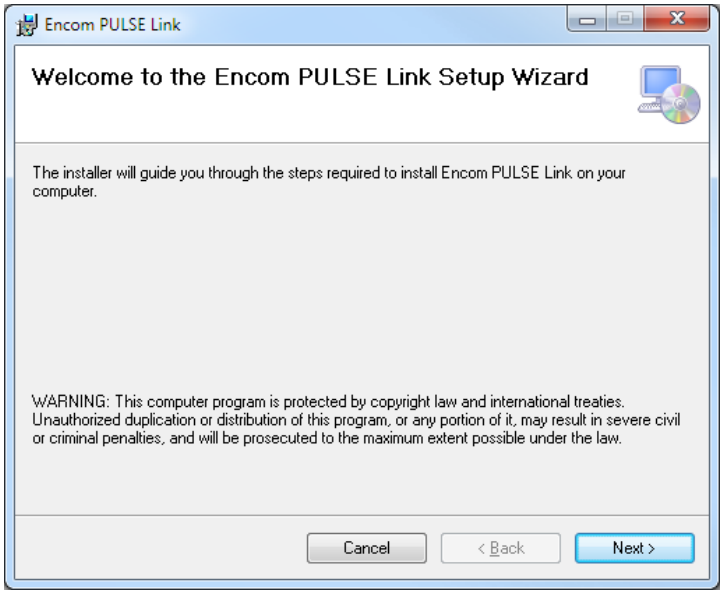
# Installing the PULSE Link Software

| NOTE | Although ENCOM PULSE Link will run under a standard user account, you will need administrator privileges to install the application. Please contact your IT department if you are unable to install PULSE Link due to account restrictions. |
|---|---|

After downloading ENCOM PULSE Link:

1. Double click the **EncomPulseLinkSetupVx.x.x.msi** file to start the installation process (where x.x.x is the PULSE Link version number).

2. The **ENCOM PULSE Link Setup Wizard** will appear and will guide you through the installation of the application to your computer


Encom PULSE Link
Welcome to the Encom PULSE Link Setup Wizard
The installer will guide you through the steps required to install Encom PULSE Link on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

Click **Next** to proceed.

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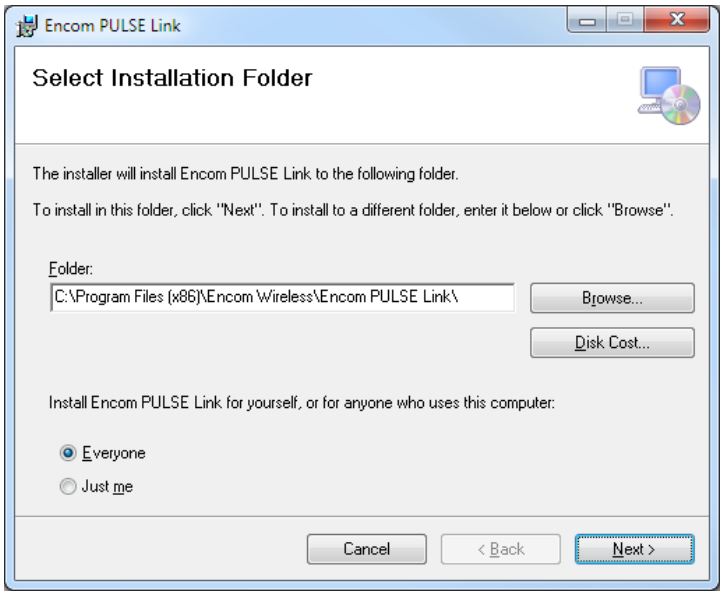
3. Select the folder on your computer where you would like ENCOM PULSE Link to be installed.

   You can also instruct the setup wizard to install PULSE Link for all users or the currently logged in user. Note that in both cases, you need to have administrator privileges in order to successfully install the application.


Encom PULSE Link
Select Installation Folder
The installer will install Encom PULSE Link to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files (x86)\Encom Wireless\Encom PULSE Link\
Browse...
Disk Cost...
Install Encom PULSE Link for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

   Click **Next** to proceed.

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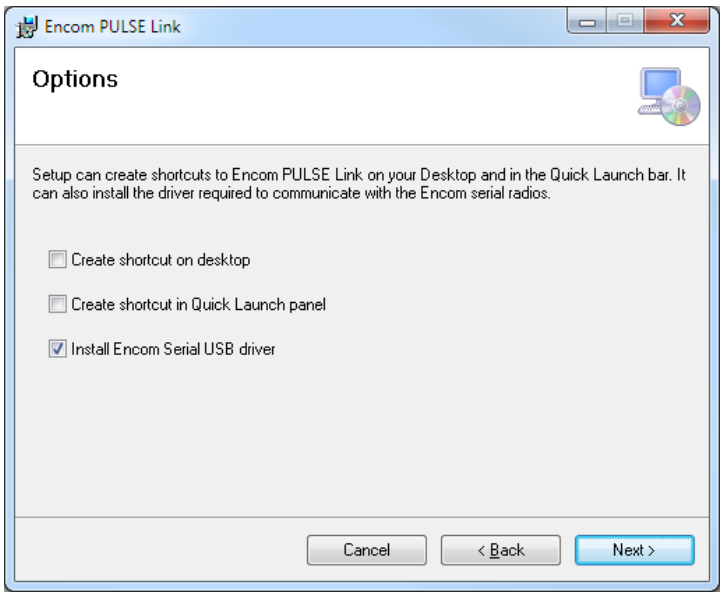
4. Select the desired options. Note that a shortcut will always be created under **Programs -> Encom -> PULSE Link** in the Windows **Start** menu. The **Desktop** and **Quick Launch** shortcuts simply provide alternate means to access the application.

   If this is the first time that you install ENCOM PULSE Link, ensure that the **Install Encom Serial USB Driver** option is checked. The setup program will pre-install the appropriate driver files on your computer, and the driver will be automatically installed when you connect to a 900 MHz serial radio with the USB cable. Leaving this option checked won't affect a driver that has already been installed.


Encom PULSE Link
Options
Setup can create shortcuts to Encom PULSE Link on your Desktop and in the Quick Launch bar. It can also install the driver required to communicate with the Encom serial radios.
Create shortcut on desktop
Create shortcut in Quick Launch panel
Install Encom Serial USB driver
Cancel
< Back
Next >

   Click **Next** to proceed.

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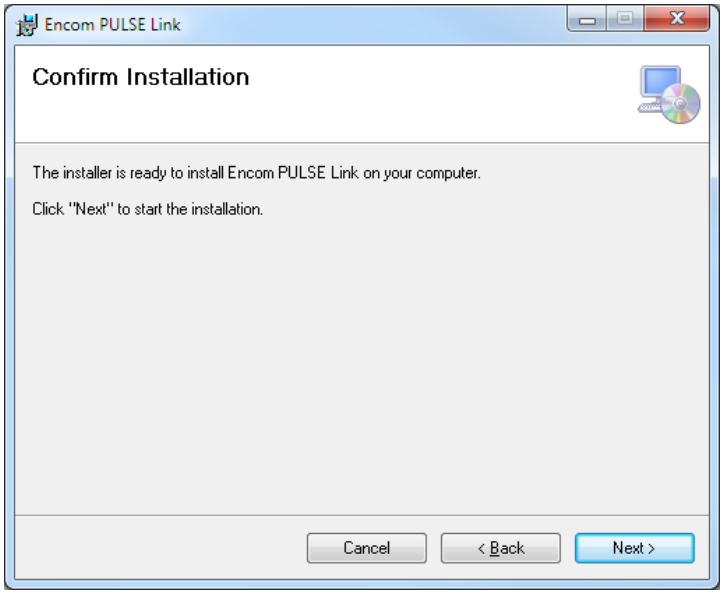
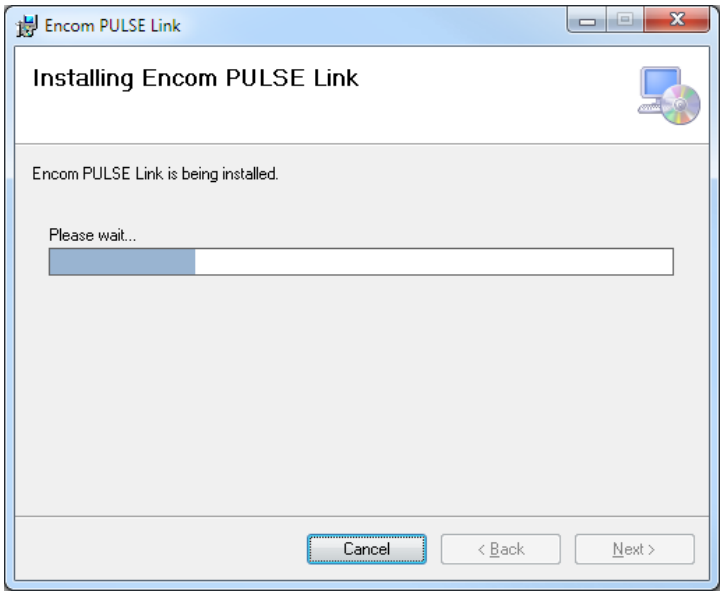
5. The final confirmation page is shown.


Encom PULSE Link
Confirm Installation
The installer is ready to install Encom PULSE Link on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

Click **Next** to proceed.

6. ENCOM PULSE Link will be installed on your computer.




Enter the appropriate administrator account credentials if you are prompted to do so.

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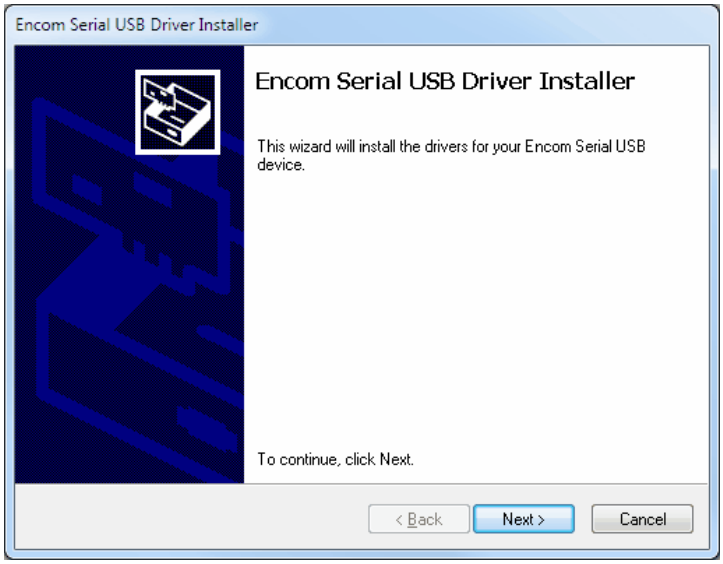
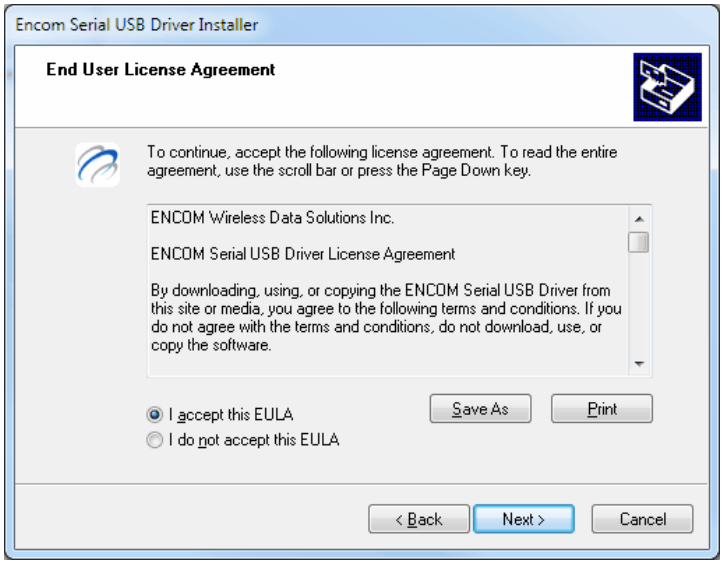
7. If you checked the **Install Encom Serial USB Driver** option, the driver installation wizard will be displayed.


Encom Serial USB Driver Installer
Encom Serial USB Driver Installer
This wizard will install the drivers for your Encom Serial USB device.
To continue, click Next.
< Back
Next >
Cancel

Click **Next** to proceed.

8. The driver license page is shown:


Encom Serial USB Driver Installer
End User License Agreement
To continue, accept the following license agreement. To read the entire agreement, use the scroll bar or press the Page Down key.
ENCOM Wireless Data Solutions Inc.
ENCOM Serial USB Driver License Agreement
By downloading, using, or copying the ENCOM Serial USB Driver from this site or media, you agree to the following terms and conditions. If you do not agree with the terms and conditions, do not download, use, or copy the software.
I accept this EULA
I do not accept this EULA
Save As
Print
< Back
Next >
Cancel

Select the **I accept this EULA** option, and click **Next** to proceed.

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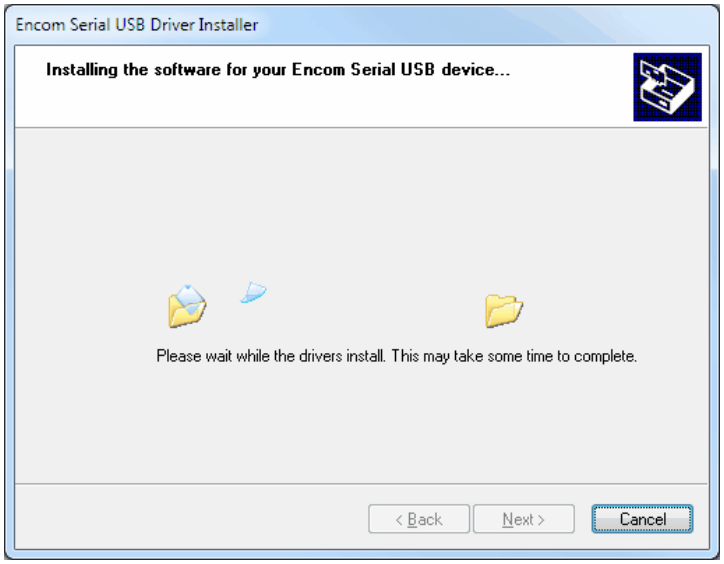
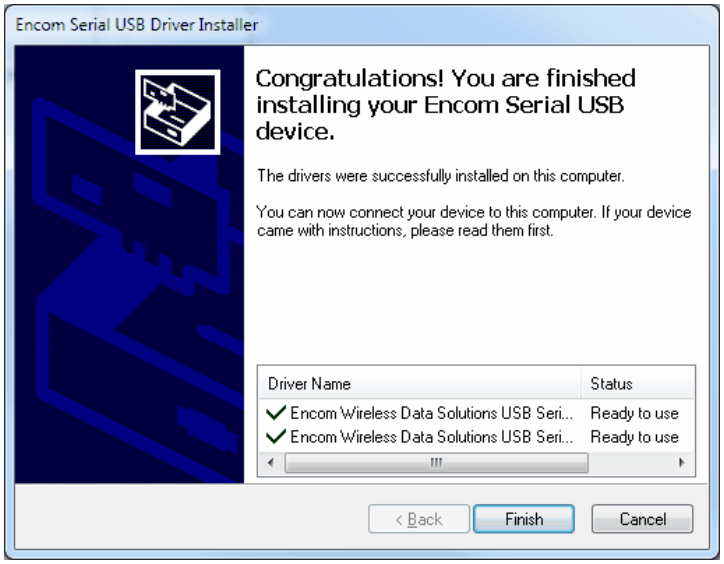
9. The ENCOM Serial USB drivers will be installed on your computer.


Encom Serial USB Driver Installer
Installing the software for your Encom Serial USB device...
Please wait while the drivers install. This may take some time to complete.
< Back
Next >
Cancel

During the installation process, you may be prompted for permission to install the drivers. Answer **Yes** or **OK** to all prompts.

10. When the driver installation is completed, click **Finish** to exit the driver installation wizard.


Encom Serial USB Driver Installer
Congratulations! You are finished installing your Encom Serial USB device.
The drivers were successfully installed on this computer.
You can now connect your device to this computer. If your device came with instructions, please read them first.
Driver Name
Status
Encom Wireless Data Solutions USB Seri...
Ready to use
Encom Wireless Data Solutions USB Seri...
Ready to use
< Back
Finish
Cancel

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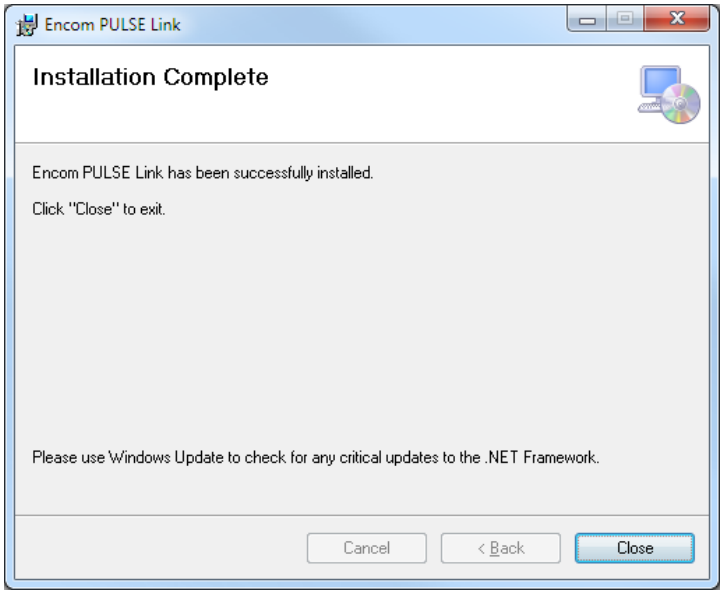
11. Finally click **Close** to exit the PULSE Link installation wizard.


Encom PULSE Link
Installation Complete
Encom PULSE Link has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

12. ENCOM PULSE Link is now installed on your computer.

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# Chapter 3: Using ENCOM PULSE Link

## Running ENCOM PULSE Link

You can run ENCOM PULSE Link using any of the following methods

- Select **Programs -> Encom -> PULSE Link -> Encom PULSE Link** from the Windows **Start** menu
- If you requested that a PULSE Link shortcut be installed on your desktop, you can start PULSE Link by double-clicking the desktop icon:

- If you requested that a PULSE Link shortcut be installed in the QuickLaunch panel, you can start PULSE Link by clicking on the QuickLaunch icon:

## Connecting to a Radio

ENCOM PULSE Link supports two families of 900 MHz serial radios:

- ENCOM PULSE radios (configured via USB interface)
- ENCOM iPULSE radios (configured via Ehthernet interface)
- ENCOM 5000 series adapter boards (configured via Serial interface)

To connect to a radio, follow the procedures found in the following topics:

- Connecting to a PULSE Radio
- Connecting to an iPULSE Radio
- Connecting to a 5000 Series Radio

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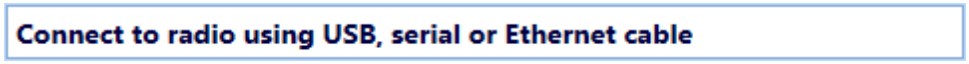
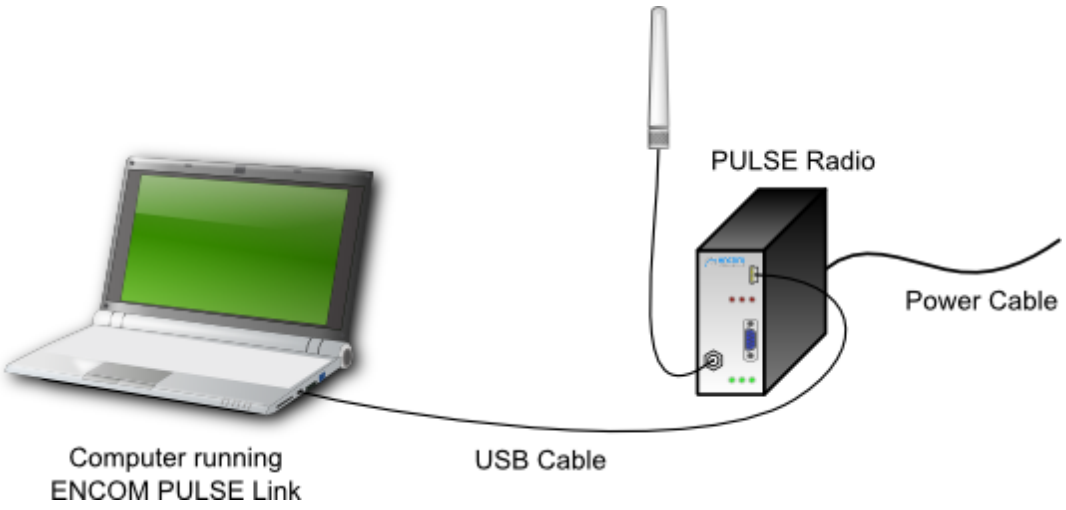
## Connecting to a PULSE Radio

To connect to an ENCOM PULSE radio, follow the procedure listed below:

1. Run the ENCOM PULSE Link application on your computer.
2. The Status Bar at the top right-hand corner of the application's window will prompt you to connect to a radio.




3. Power the PULSE radio with the provided wall mount power adapter, and then connect the radio to your computer with the included USB cable.




4. ENCOM PULSE Link will detect the radio and attempt to communicate with it.

5. When PULSE Link is able to communicate with the radio, it will automatically retrieve its configuration settings.

Note that when the status bar is red, you should not disconnect the USB cable from the radio, nor should you remove power from the radio. Doing so could prevent the radio from being able to communicate properly over the serial port (or the FSK port for FSK radios). If this happens, you may have to use PULSE Link again to restore the radio's configuration.

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6. After the radio's configuration settings have been retrieved, the radio is shown as being on-line.

7. The radio configuration panel is displayed. At this point you can use ENCOM PULSE Link to manage your radio.

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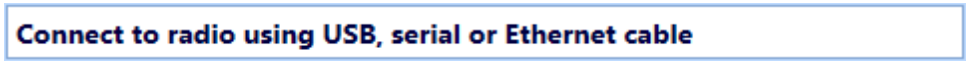
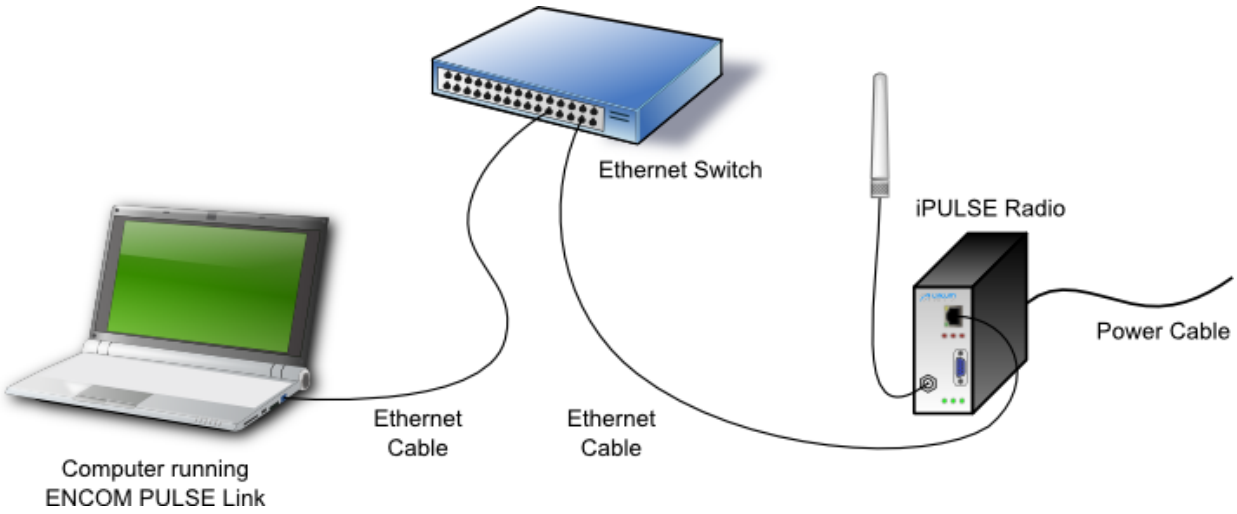
## Connecting to an iPULSE Radio

To connect to an ENCOM iPULSE radio, follow the procedure listed below:

1. Run the ENCOM PULSE Link application on your computer.
2. The Status Bar at the top right-hand corner of the application's window will prompt you to connect to a radio.

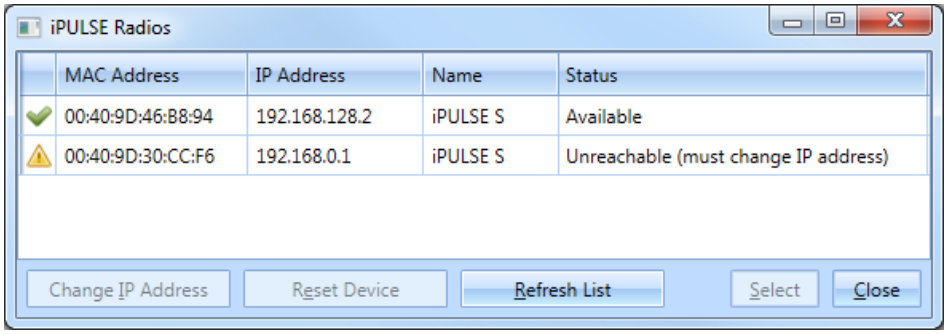



3. Power the iPULSE radio with the provided wall mount power adapter, and then connect the radio to your computer using an Ethernet cable.




4. Click the **Search for iPULSE radios** button at the left of the status bar.

5. The **iPULSE Radios** form is displayed.




While this form is visible, PULSE Link is actively searching for iPULSE radios. It will detect

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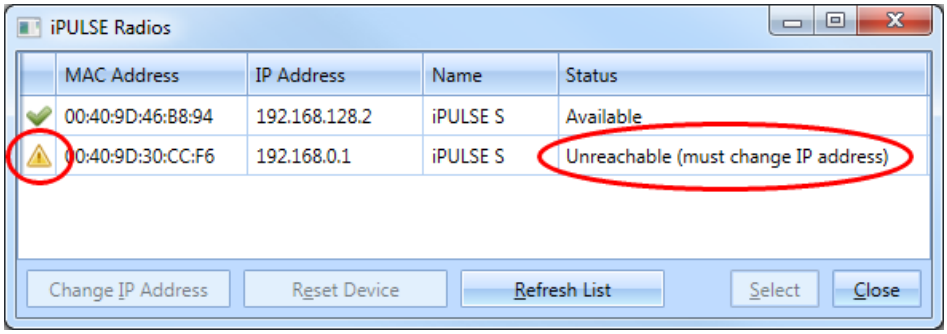
and list all iPULSE radios that are connected to your local network. It will **NOT** detect an iPULSE radio if there is a router between the radio and the computer running the PULSE Link application.

6. If you have just received your iPULSE radio from ENCOM, its default IP address may not be compatible with your local network. In this case, a ⚠ indicator is shown at the left of radio's MAC Address, and the **Status** column indicates that you must change the radio's IP address.



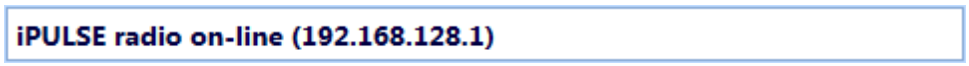

In order to connect to a radio that is unreachable, you will have to change it's IP address to a compatible value. Refer to the Changing the IP Address of an iPULSE Radio topic for more information.

7. To connect to a radio, select the radio item in the radio list, and then click the **Select** button. Alternatively, you can double-click the left mouse button on the radio item in the radio list.

8. The status indicator will briefly display a message while the radio's configuration settings are retrieved.

Note that when the status bar is red, you should not disconnect the Ethernet cable from the radio, nor should you remove power from the radio.

9. After the radio's configuration settings have been retrieved, the radio is shown as being on-line.

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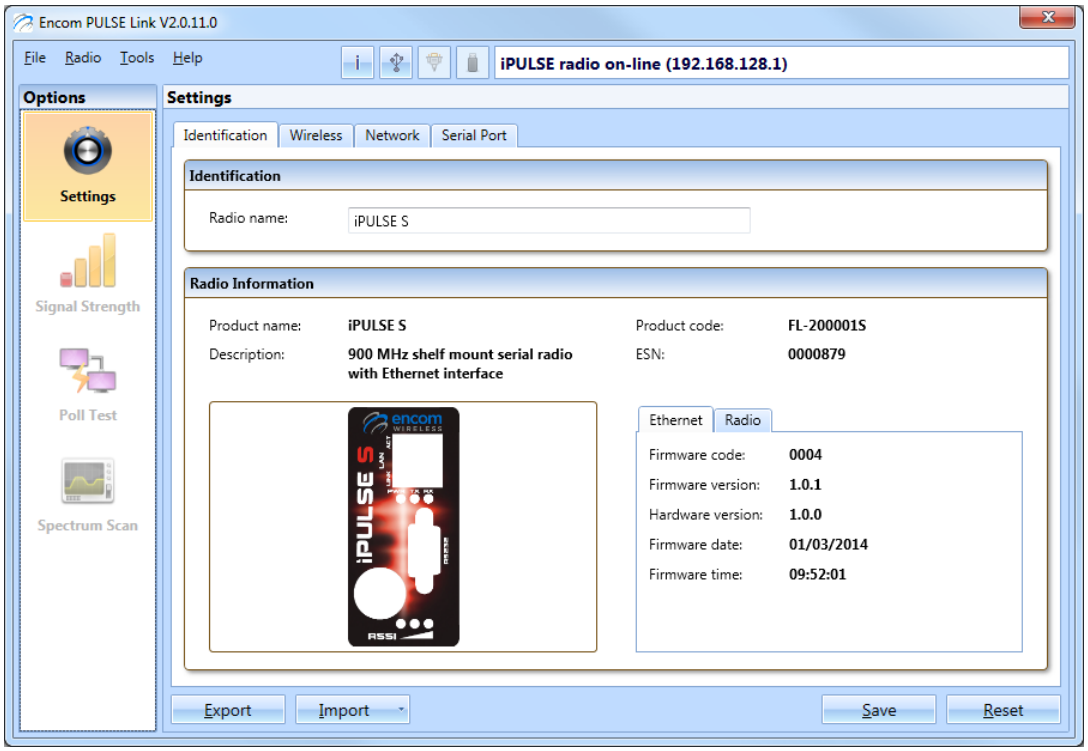
10. The radio configuration panel is displayed. At this point you can use ENCOM PULSE Link to manage your radio.





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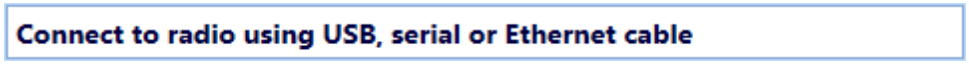
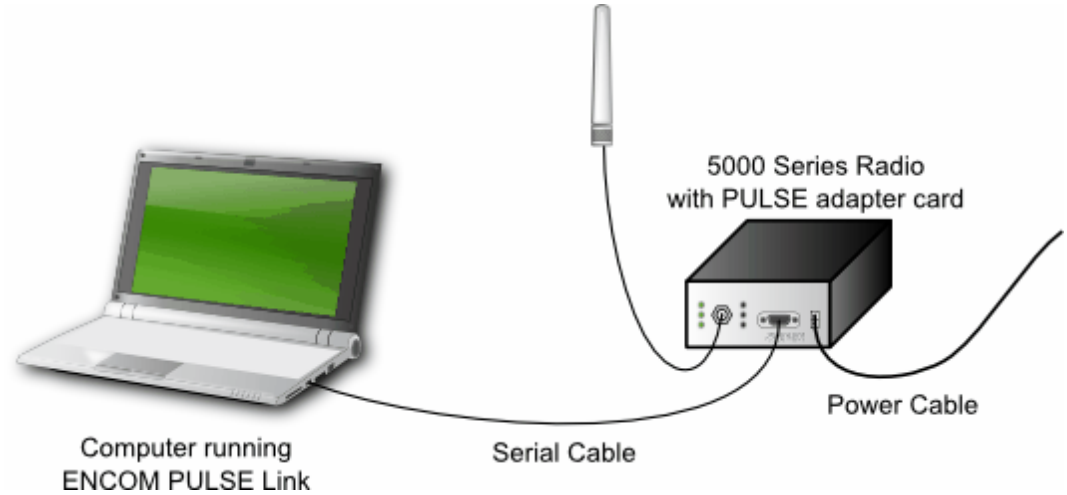
## Connecting to a 5000 Series Radio

To connect to a 5000 series radio in which a 5000 series adapter card has been installed:

1. Run the ENCOM PULSE Link application on your computer.
2. The Status Bar at the top right-hand corner of the application's window will prompt you to connect to a radio.

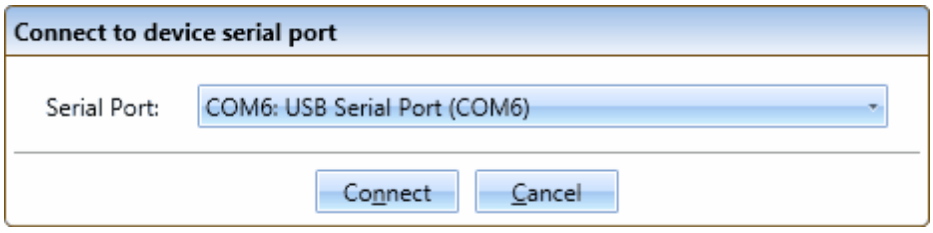



3. Power the 5000 series radio with the provided wall mount power adapter, and then connect the radio to your computer using a serial or serial-to-USB adapter cable.




4. Click the **Connect to serial device** button at the left of the status bar.

5. The *Connect to device serial port* form is displayed.




6. Select the serial communications port to which the radio is connected, and then click the **Connect** button.

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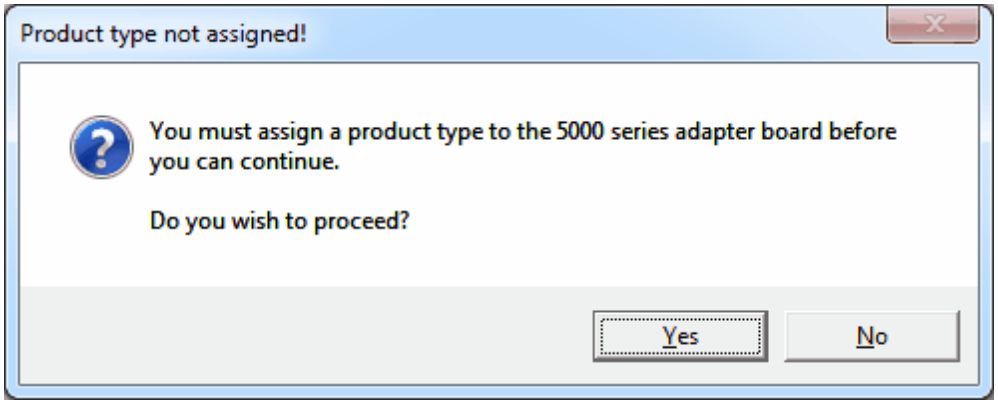
7. ENCOM PULSE Link will detect the radio and attempt to communicate with it.

8. When PULSE Link is able to communicate with the radio, it will automatically retrieve its configuration settings.

Note that when the status bar is red, you should not disconnect the serial cable from the radio, nor should you remove power from the radio. Doing so could prevent the radio from being able to communicate properly over the serial port (or the FSK port for FSK radios). If this happens, you may have to use PULSE Link again to restore the radio's configuration.

9. If a product code has not yet been assigned to the 5000 series adapter card, you will be prompted to do so:


Product type not assigned!
You must assign a product type to the 5000 series adapter board before you can continue.
Do you wish to proceed?
Yes
No

Refer to the Setting the 5000 Series Radio Product Code topic for instructions on setting the product code.

10. After the radio's configuration settings have been retrieved, the radio is shown as being on-line.

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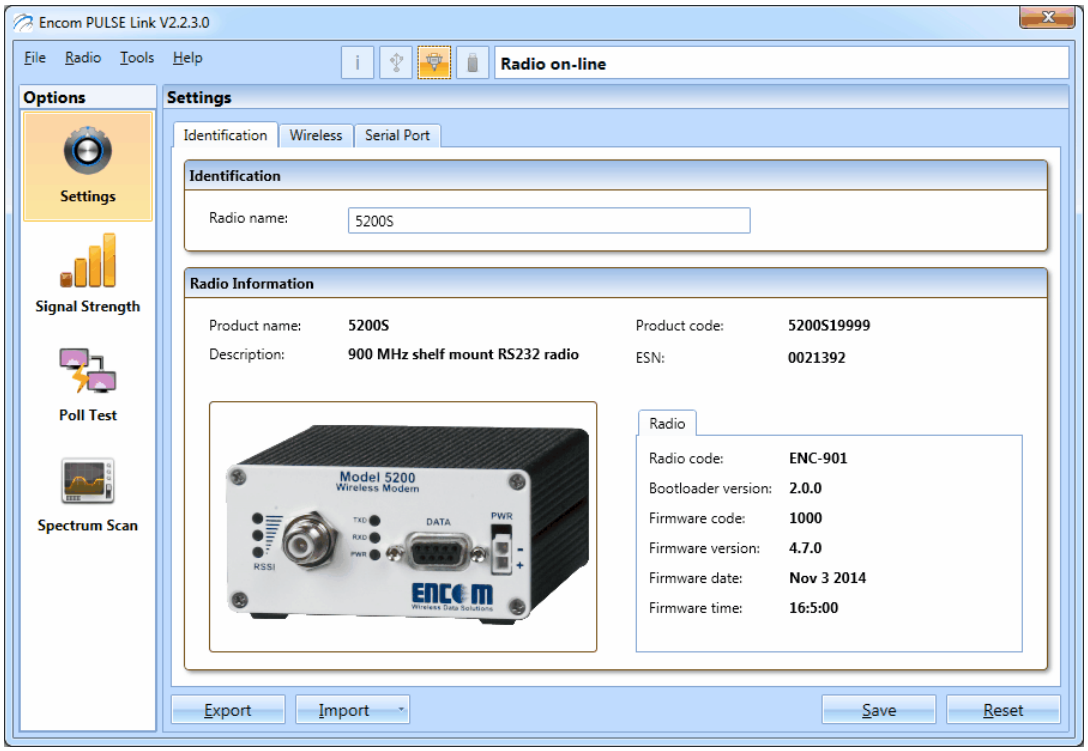
11. The radio configuration panel is displayed. At this point you can use ENCOM PULSE Link to manage your radio.

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### Setting the 5000 Series Radio Product Code

When you connect to a 5000 series radio in which a 5000 series adapter card has been installed, you will be prompted to assign a product type to the adapter card. To following steps describe the process of assigned the product type:

1. Run the ENCOM PULSE Link application on your computer.
2. Connect to the 5000 series radio using a serial or serial-to-USB cable.
3. After the radio is discovered, you will be prompted to assign a product type:

Product type not assigned!
You must assign a product type to the 5000 series adapter board before you can continue.
Do you wish to proceed?
Yes
No

4. Click the **Yes** button to proceed.

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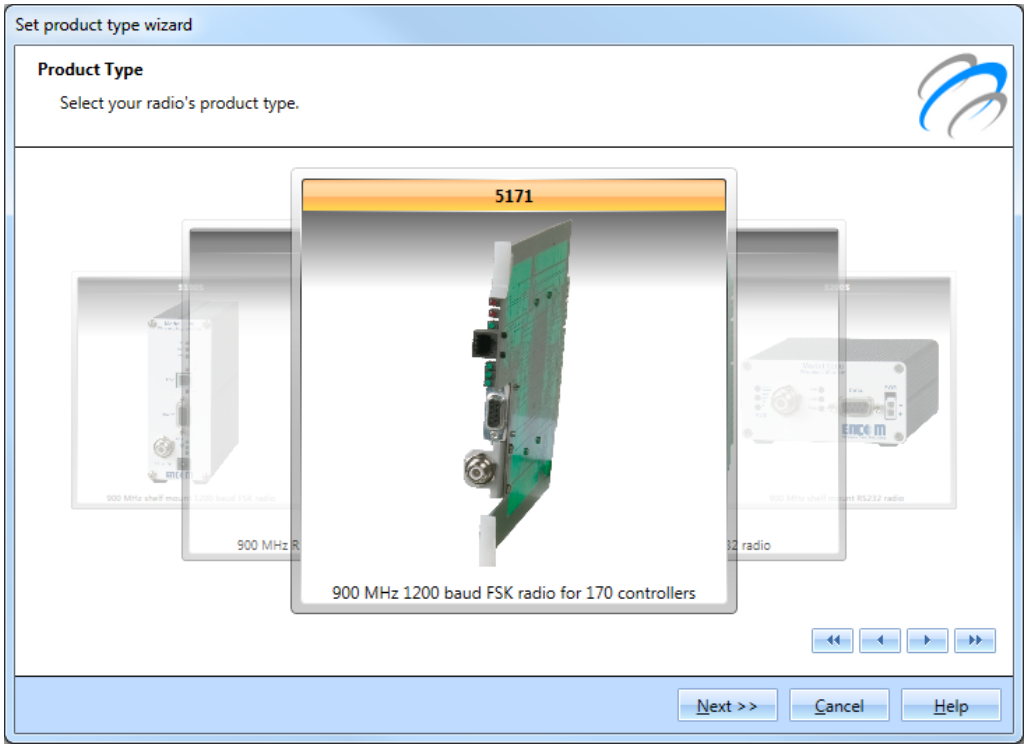
5. The *Set product type wizard* will be displayed:




6. Select the model associated with your 5000 series radio. The model name is normally found on the front of the radio. Make sure that you choose the correct model, otherwise the radio may not operate properly.
7. Press **Next** to continue.

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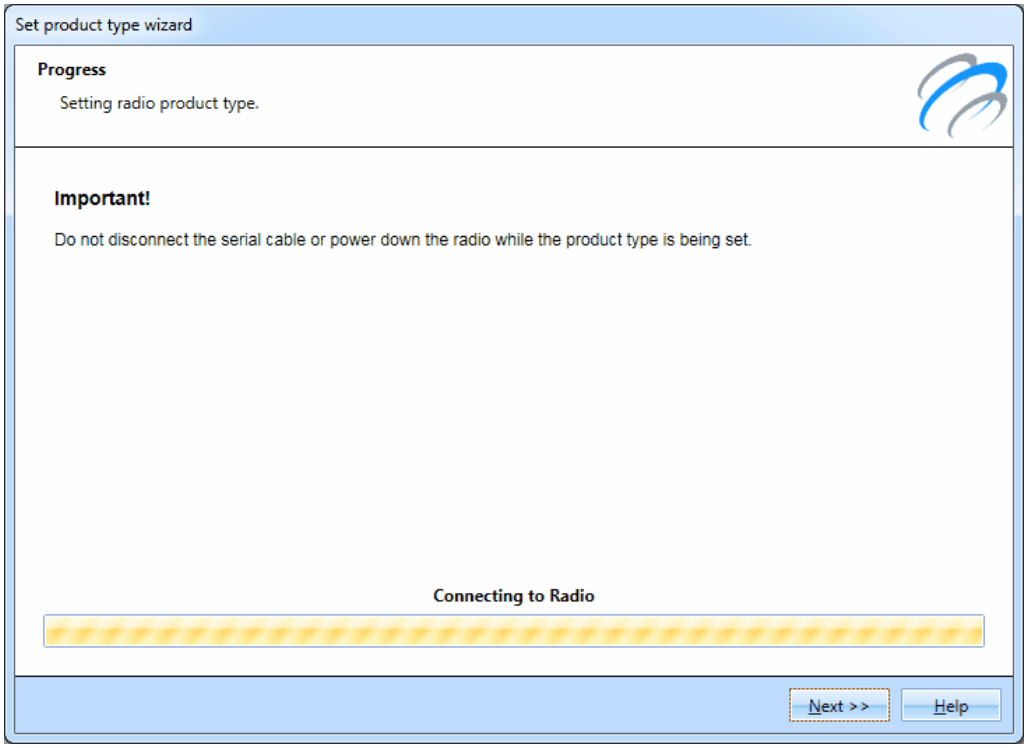
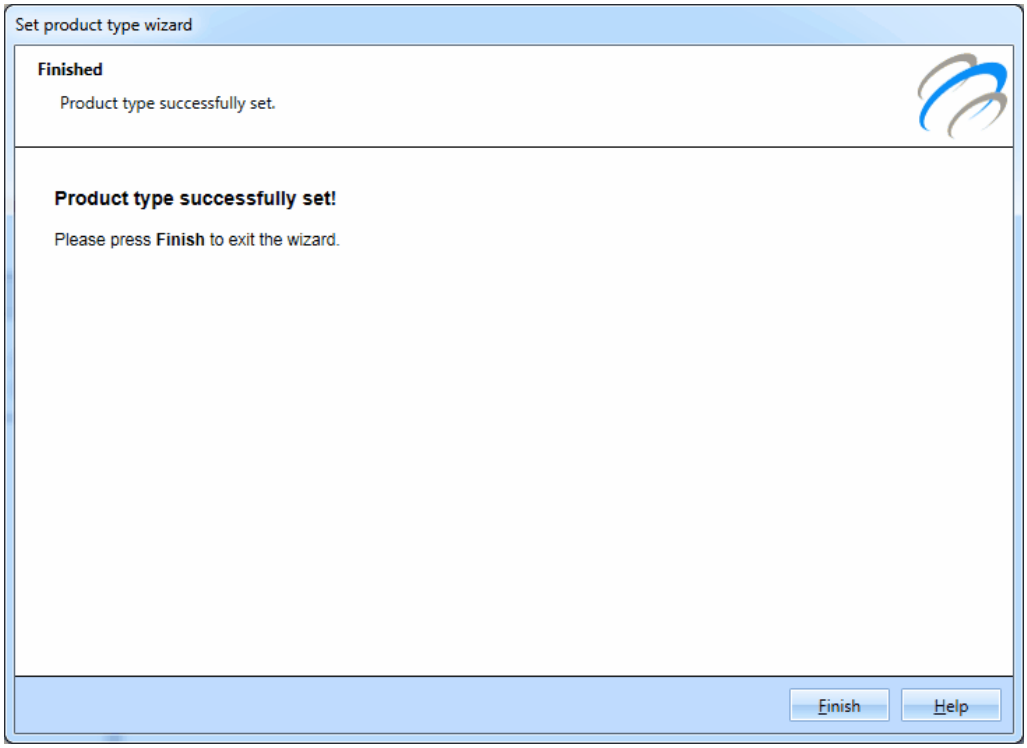
The wizard will display a progress bar while the radio is configured.


Set product type wizard
Progress
Setting radio product type.
Important!
Do not disconnect the serial cable or power down the radio while the product type is being set.
Connecting to Radio
Next >>
Help

8. After the radio is configured, the wizard will display the following report:

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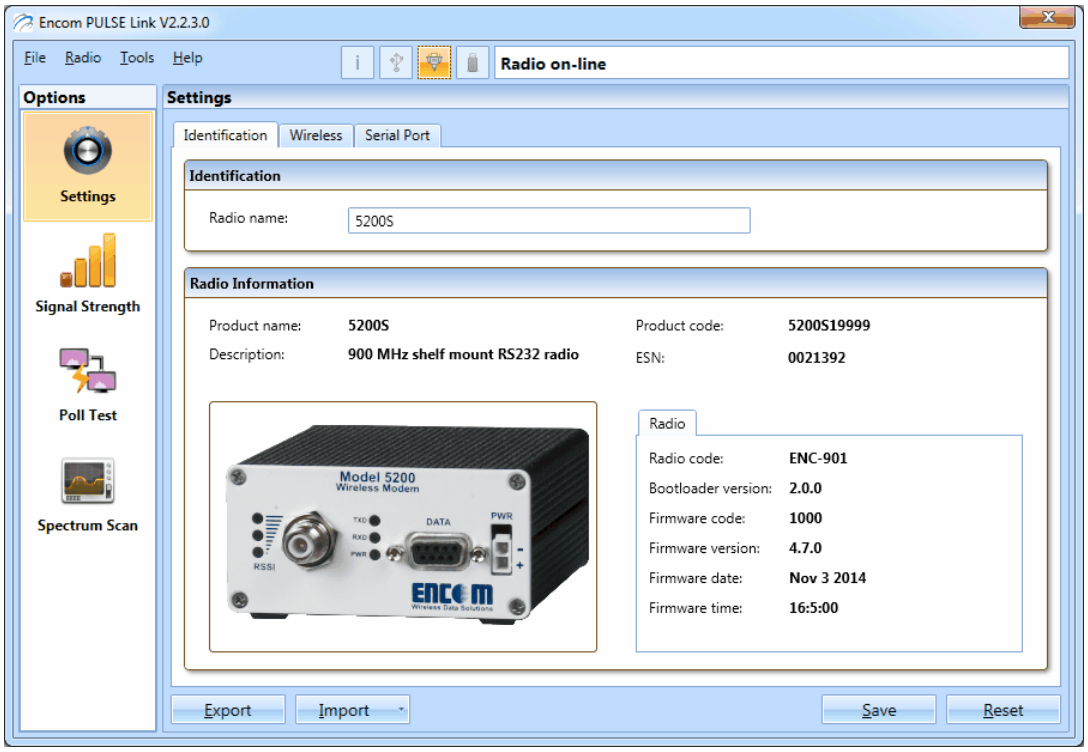
9. Click **Finish** to return to the main window.

10. PULSE Link will retrieve the radio's new configuration, and show the radio as being on-line.

11. The radio configuration panel is displayed. At this point you can use ENCOM PULSE Link to manage your radio.

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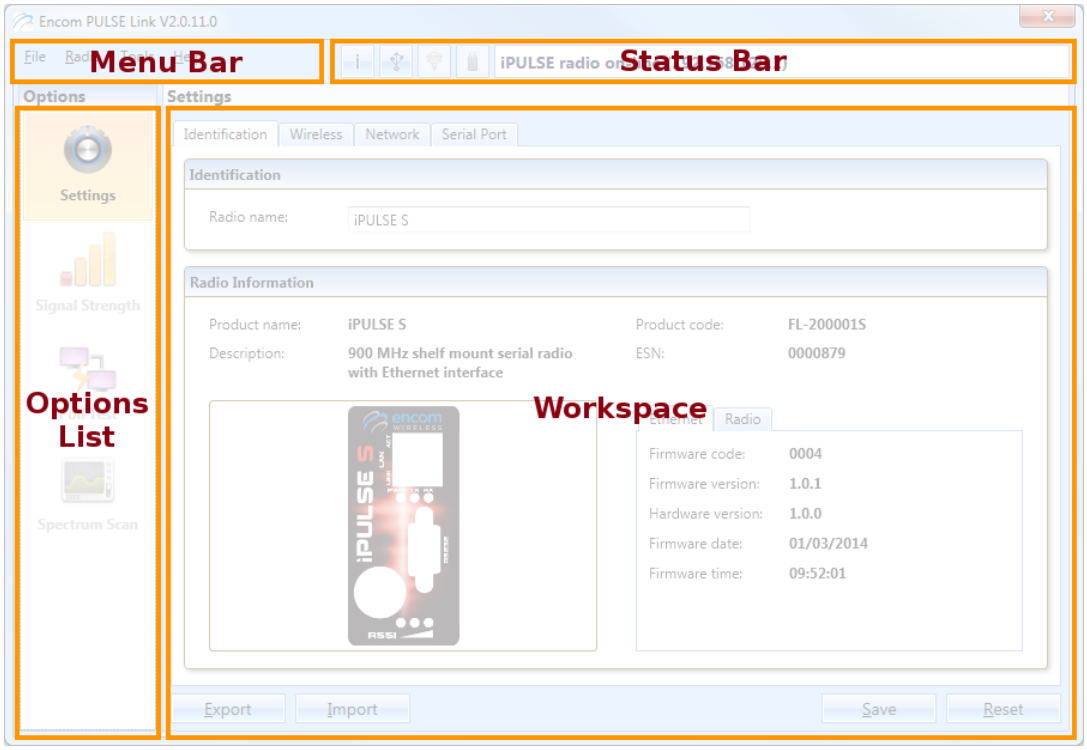
## User Interface

The following screen shot shows the main window of a typical ENCOM PULSE Link session:




The main features of the PULSE Link user interface include:

- A Menu Bar at the top of the window that allows you to access the application's less-frequently used features.
- A Status Bar that displays the current state of the application.
- An Options List that allows you to choose the task you want to carry out.
- A Workspace that contains the user interface associated with the currently selected option. Depending on the type of radio connected to PULSE Link, one of more of the following options are available:
  - Settings
  - Signal Strength
  - Poll Test
  - Spectrum Scan

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## Menu Bar

The main menu bar provides access to the less-frequently used ENCOM PULSE Link functions. The following options are available:

- File Menu
  - Exit
- Radio Menu
  - Upgrade
  - Recover
  - Restore to Factory Defaults
- Tools Menu
  - Demo Mode
- Help Menu
  - Topics
  - About


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## File Menu Functions

### Exit

Select **Exit** from the **File** menu to shut down ENCOM PULSE Link.

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## Radio Menu Functions

### Upgrade

Select **Upgrade** from the **Radio** menu to upgrade (or downgrade) the radio's firmware.

The upgrade processes for PULSE and iPULSE radios are significantly different. Refer to the appropriate topic for the type of radio you are upgrading:

- Upgrading a PULSE Radio
- Upgrading an iPULSE Radio
- Upgrading a 5000 Series Radio


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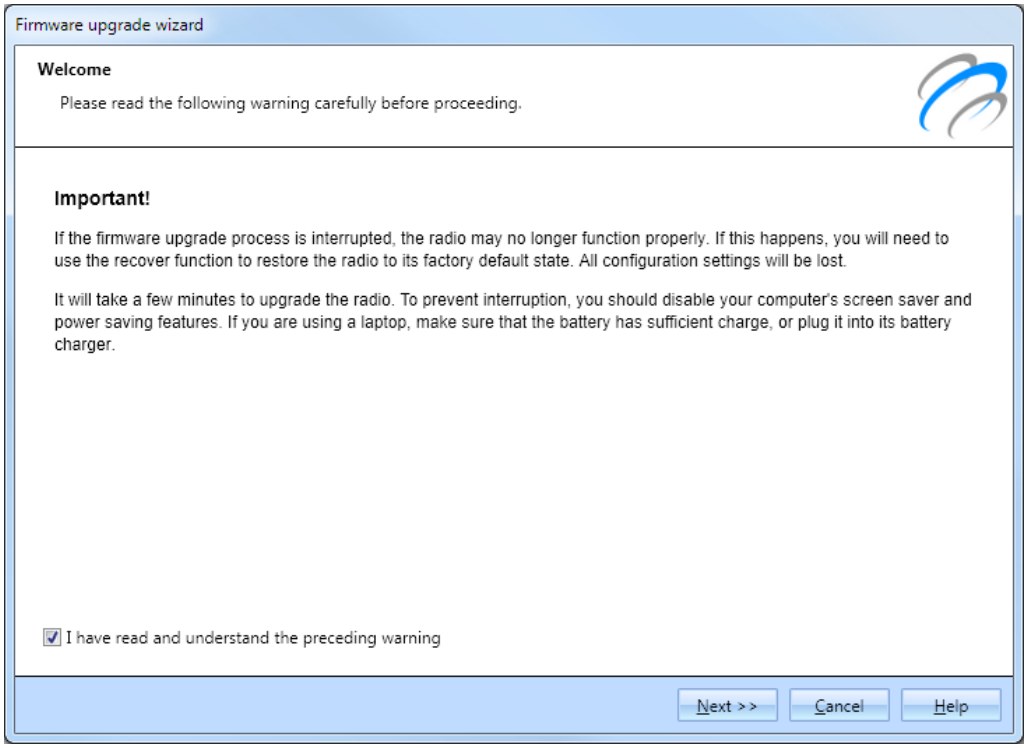
**Upgrading a PULSE Radio**

To upgrade a PULSE radio's firmware:

1. Make sure that the radio is powered, and then connect it to your computer via the USB cable.
2. Wait until PULSE Link has retrieved the radio's configuration settings.
3. Select **Upgrade** from the **Radio** menu. The *Firmware upgrade wizard* form is displayed:


Firmware upgrade wizard
Welcome
Please read the following warning carefully before proceeding.
Important!
If the firmware upgrade process is interrupted, the radio may no longer function properly. If this happens, you will need to use the recover function to restore the radio to its factory default state. All configuration settings will be lost.
It will take a few minutes to upgrade the radio. To prevent interruption, you should disable your computer's screen saver and power saving features. If you are using a laptop, make sure that the battery has sufficient charge, or plug it into its battery charger.
I have read and understand the preceding warning
Next >>
Cancel
Help

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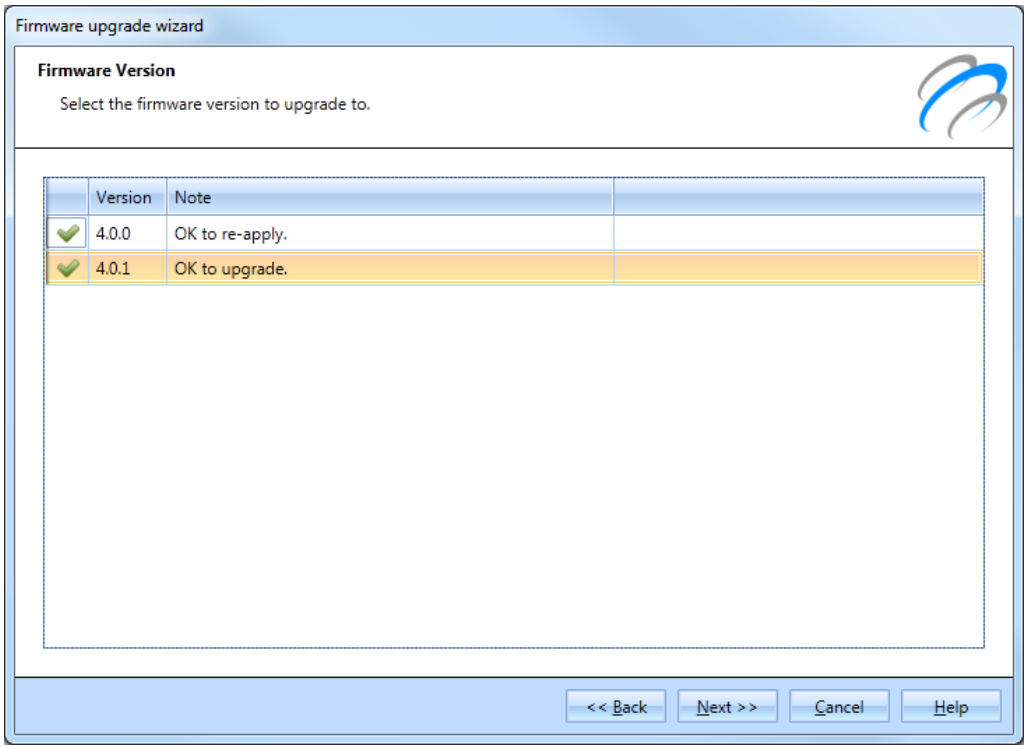
4. Check the **I have read and understand the preceding warning** option, and then click **Next** to continue.

   The wizard will display a list of all firmware available for upgrading or downgrading.

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5. Select the firmware version you want to upgrade or downgrade to. Unless instructed to do so, you should always upgrade to the latest firmware version. Click **Next** to continue:

   The wizard will display a progress bar while the radio is upgraded.

Firmware upgrade wizard
Progress
Firmware upgrade in progress.
Important!
Do not disconnect the USB cable or power down the radio while the upgrade is in progress.
Upgrading Firmware
Help

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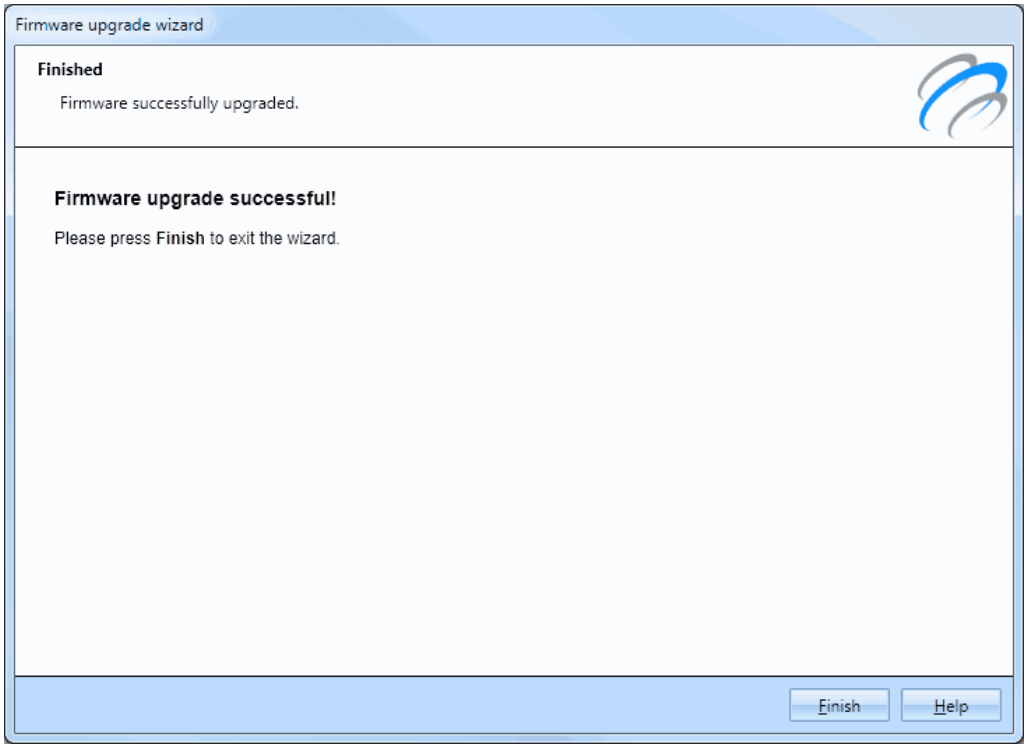
6. When the upgrade process is complete, the wizard will display the following report:




7. Your radio is now upgraded and ready to use. Click **Finish** to return to the main window.

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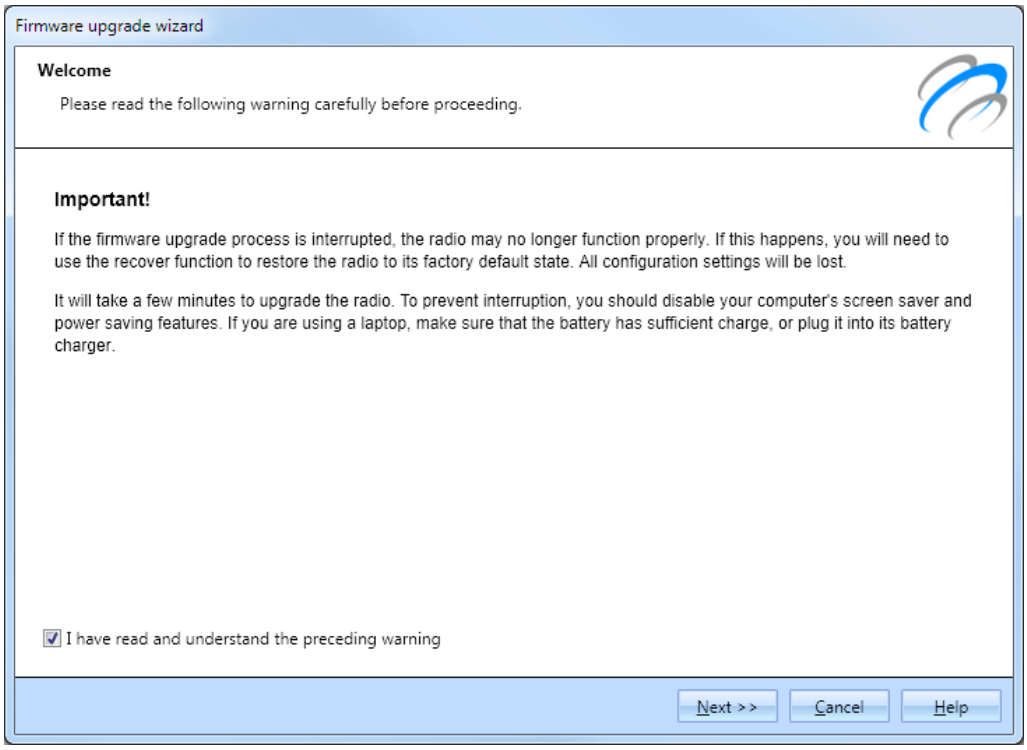
**Upgrading an iPULSE Radio**

To upgrade an iPULSE radio's firmware:

1. Connect to the iPULSE radio as described in the Connecting to an iPULSE Radio topic.
2. Select **Upgrade** from the **Radio** menu. The *Firmware upgrade wizard* form is displayed:


Firmware upgrade wizard
Welcome
Please read the following warning carefully before proceeding.
Important!
If the firmware upgrade process is interrupted, the radio may no longer function properly. If this happens, you will need to use the recover function to restore the radio to its factory default state. All configuration settings will be lost.
It will take a few minutes to upgrade the radio. To prevent interruption, you should disable your computer's screen saver and power saving features. If you are using a laptop, make sure that the battery has sufficient charge, or plug it into its battery charger.
I have read and understand the preceding warning
Next >>
Cancel
Help

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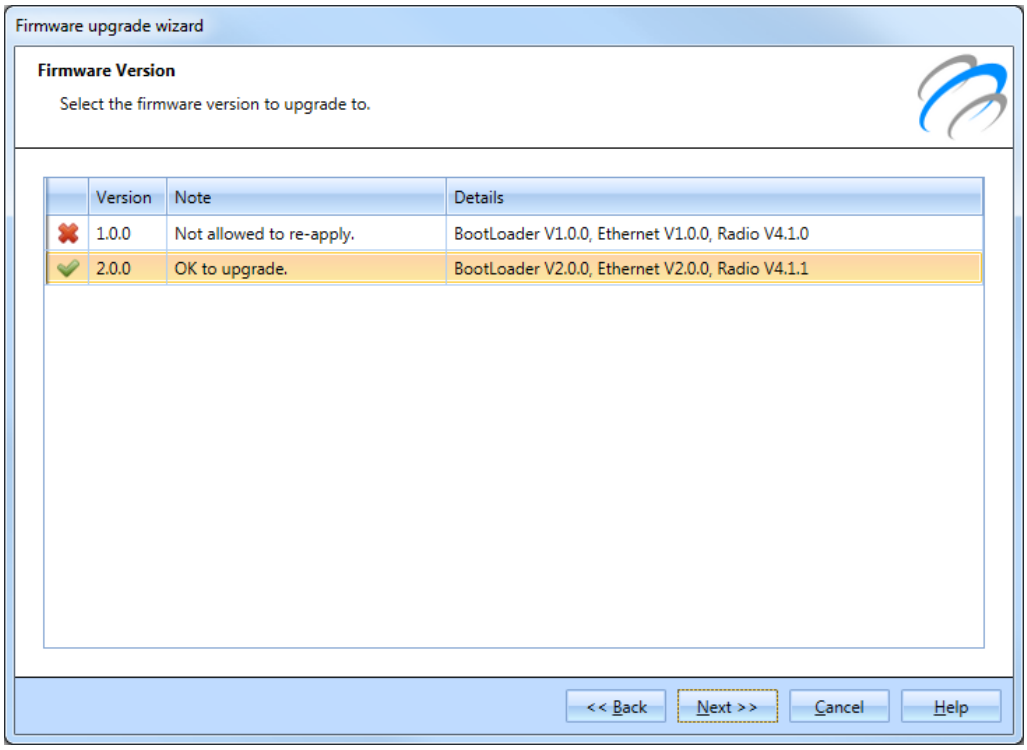
3. Check the **I have read and understand the preceding warning** option, and then click **Next** to continue.

   The wizard will display a list of all firmware available for upgrading. Note that downgrading is not currently allowed for iPULSE radios.

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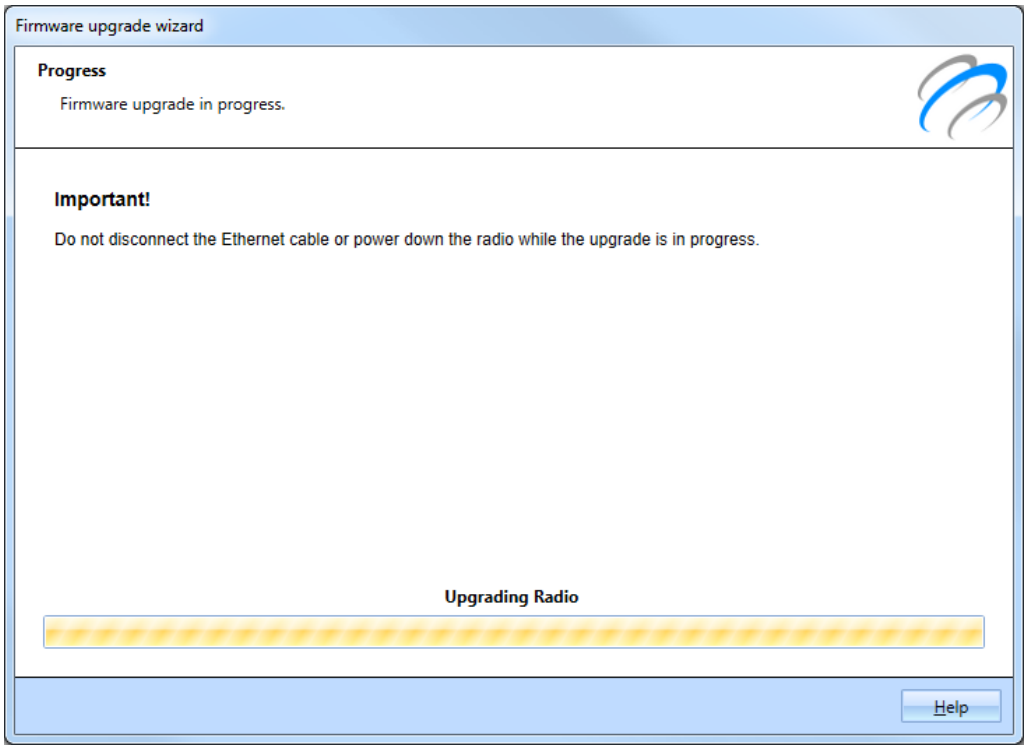
4. Select the firmware version you want to upgrade to. Unless instructed to do so, you should always upgrade to the latest firmware version. Click **Next** to continue:

   The wizard will display an activity bar while the radio is upgraded. Note that it can can take up to 5 minutes to complete a firmware upgrade.


Firmware upgrade wizard
Progress
Firmware upgrade in progress.
Important!
Do not disconnect the Ethernet cable or power down the radio while the upgrade is in progress.
Upgrading Radio
Help

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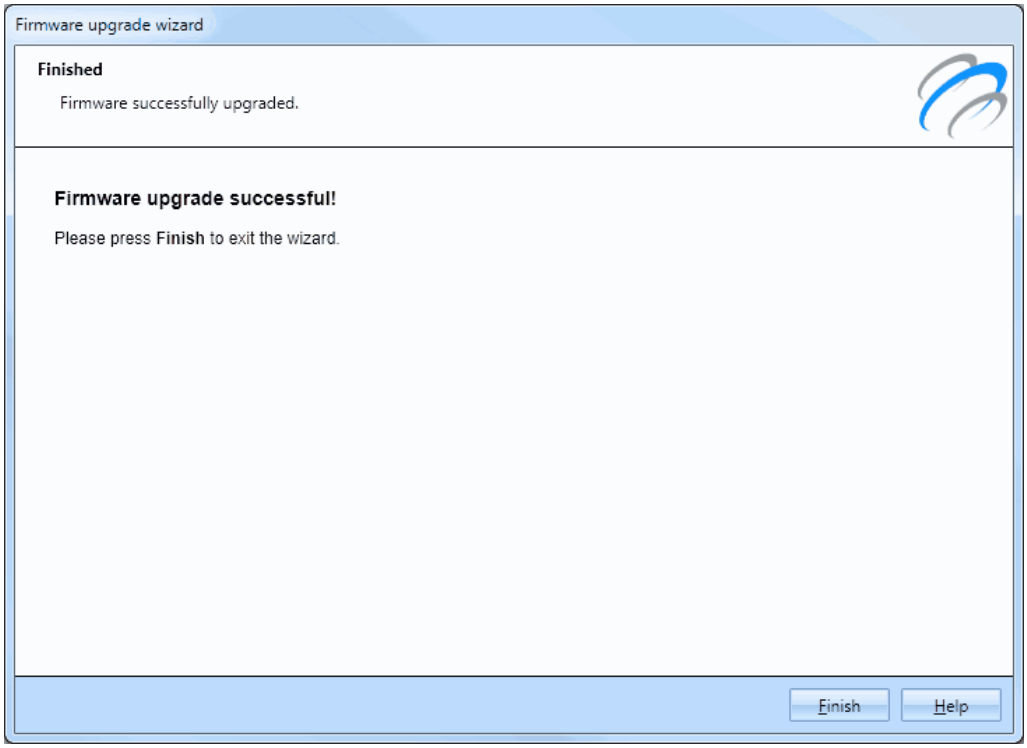
5. When the upgrade process is complete, the wizard will display the following report:




6. Your radio is now upgraded and ready to use. Click **Finish** to return to the main window.

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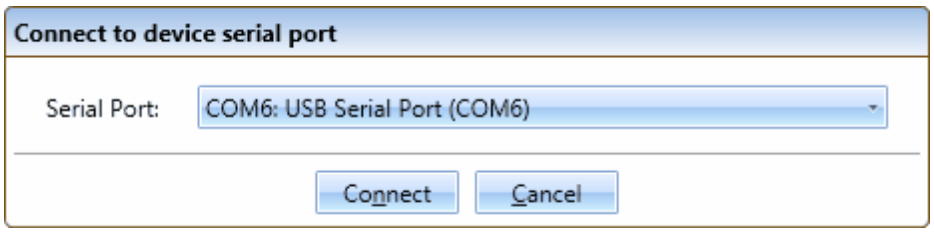
**Upgrading a 5000 Series Radio**

To upgrade a 5000 series radio in which a 5000 series adapter card has been installed:

1. Make sure that the radio is powered, and then connect it to your computer via a serial or serial-to-USB cable.
2. Click the **Connect to serial device** button at the left of the status bar.

3. The *Connect to device serial port* form is displayed.




4. Select the communications port to which the radio is connected, and then click the **Connect** button.
5. Wait until PULSE Link has retrieved the radio's configuration settings.

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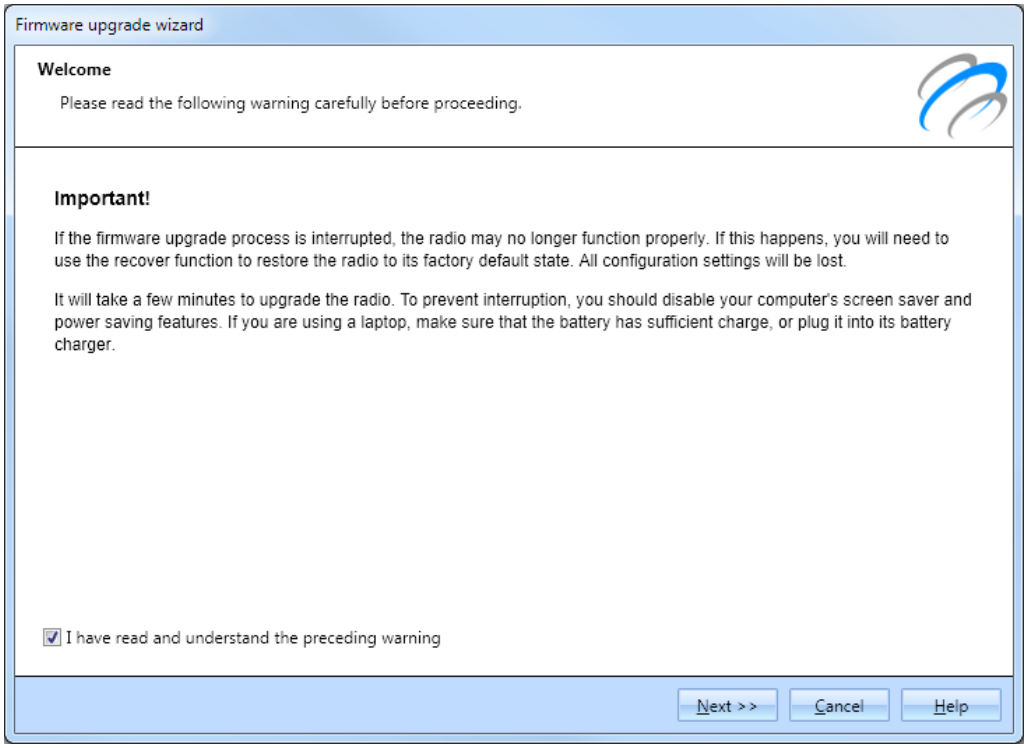
6. Select **Upgrade** from the **Radio** menu. The *Firmware upgrade wizard* form is displayed:


Firmware upgrade wizard
Welcome
Please read the following warning carefully before proceeding.
Important!
If the firmware upgrade process is interrupted, the radio may no longer function properly. If this happens, you will need to use the recover function to restore the radio to its factory default state. All configuration settings will be lost.
It will take a few minutes to upgrade the radio. To prevent interruption, you should disable your computer's screen saver and power saving features. If you are using a laptop, make sure that the battery has sufficient charge, or plug it into its battery charger.
I have read and understand the preceding warning
Next >>
Cancel
Help

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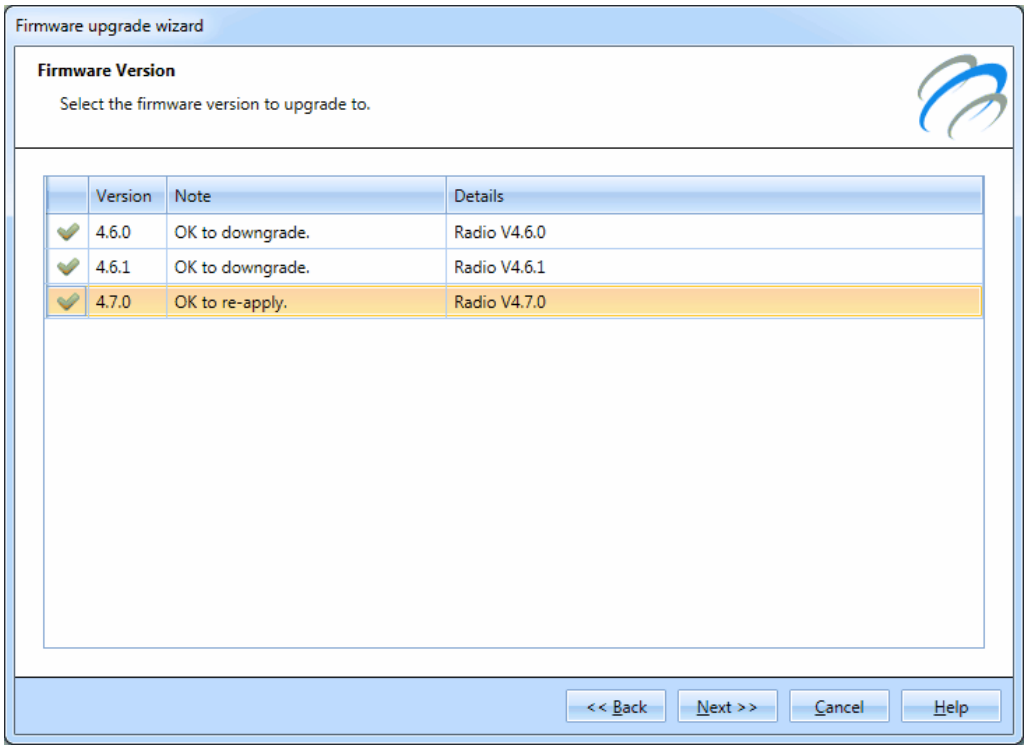
7. Check the **I have read and understand the preceding warning** option, and then click **Next** to continue.

   The wizard will display a list of all firmware available for upgrading or downgrading.

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8. Select the firmware version you want to upgrade or downgrade to. Unless instructed to do so, you should always upgrade to the latest firmware version. Click **Next** to continue:

   The wizard will display a progress bar while the radio is upgraded.

Firmware upgrade wizard
Progress
Firmware upgrade in progress.
Important!
Do not disconnect the USB cable or power down the radio while the upgrade is in progress.
Upgrading Firmware
Help

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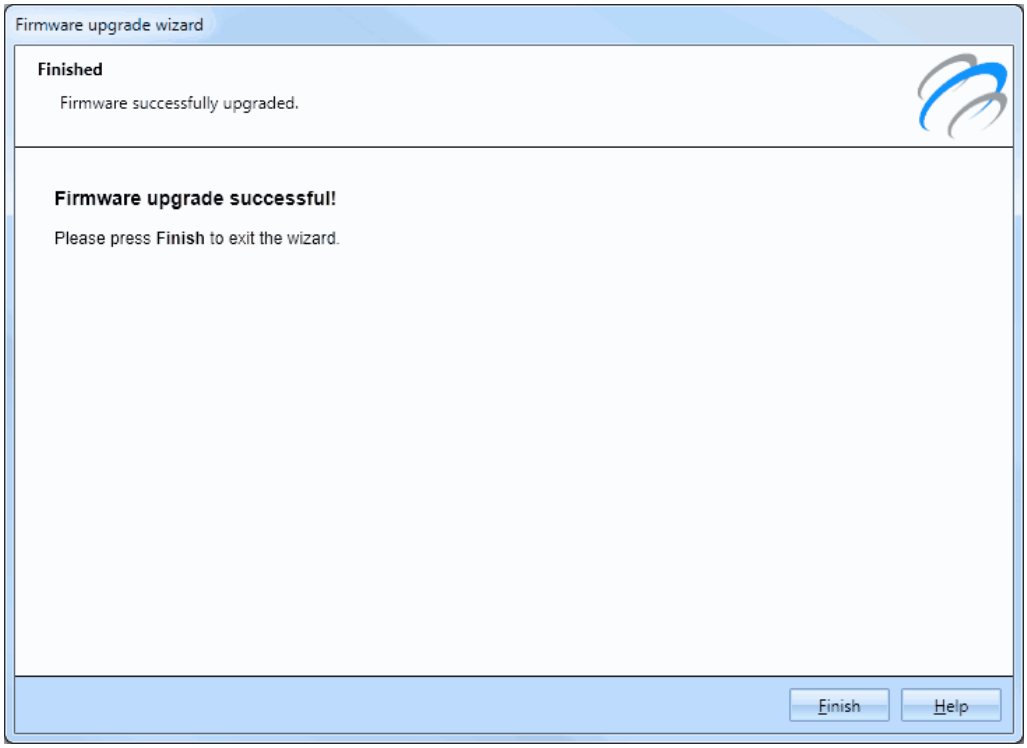
9. When the upgrade process is complete, the wizard will display the following report:




10. Your radio is now upgraded and ready to use. Click **Finish** to return to the main window.

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**Recover**

Select **Recover** from the **Radio** menu to restore a PULSE of 5000 series radio after a failed firmware upgrade. Depending on the problem with the firmware, PULSE Link may not be able to communicate with the radio. If this occurs, the application will cycle through all possible combination of baud rates and serial settings in an attempt to communicate with it. Recovering the radio may fix this issue if it occurs.

Note that it is not possible to recover an iPULSE radio if a firmware upgrade fails. If the radio no longer works after a firmware upgrade, it will have to be sent back to ENCOM for repair.

Refer to the following topic for instructions on recovering a PULSE or 5000 series radio:

- Recovering a PULSE Radio
- Recovering a 5000 Series Radio

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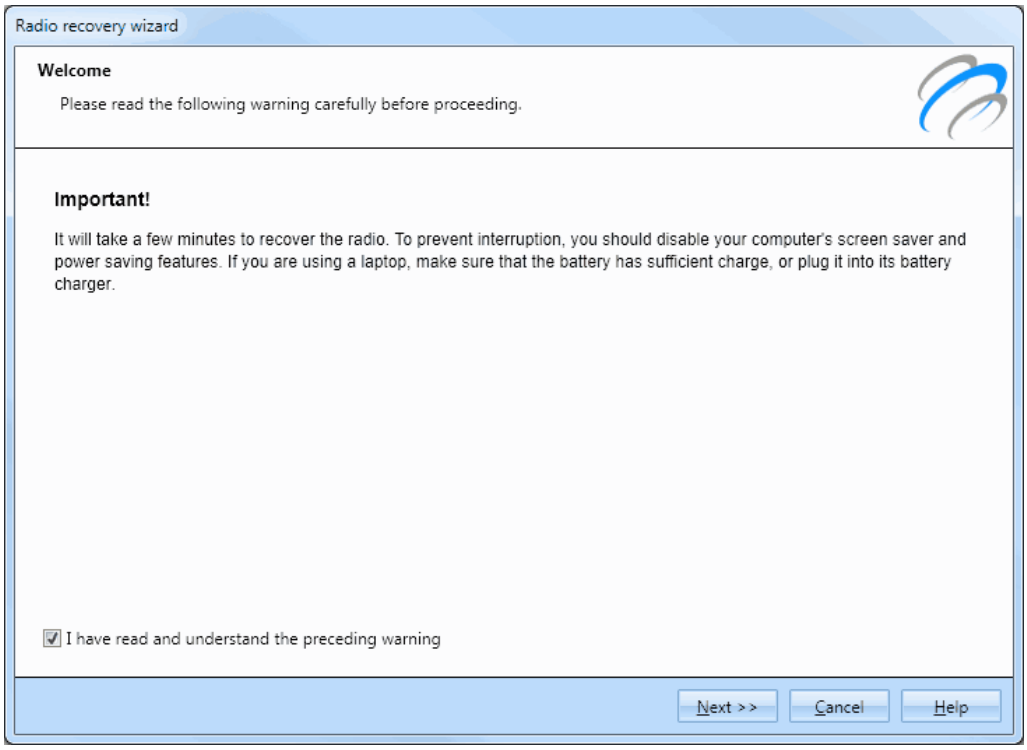
**Recovering a PULSE Radio**

To recover a PULSE radio:

1. Make sure that the radio is powered, and then connect it to your computer via the USB cable.
2. Select **Recover** from the **Radio** menu. The *Radio recovery wizard* form is displayed:


Radio recovery wizard
Welcome
Please read the following warning carefully before proceeding.
Important!
It will take a few minutes to recover the radio. To prevent interruption, you should disable your computer's screen saver and power saving features. If you are using a laptop, make sure that the battery has sufficient charge, or plug it into its battery charger.
I have read and understand the preceding warning
Next >>
Cancel
Help

3. Check the **I have read and understand the preceding warning** option, and then click **Next** to continue.

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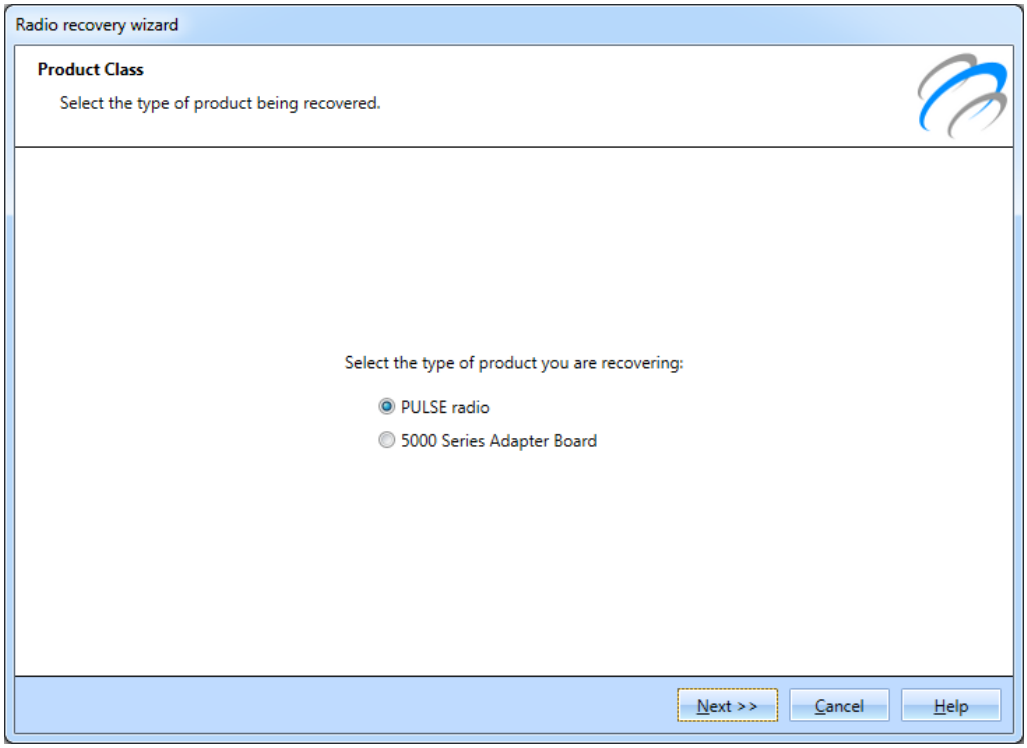
The wizard will display the type of products that are supported by PULSE Link.




4. Select the **PULSE radio** option, then then click **Next** to continue.

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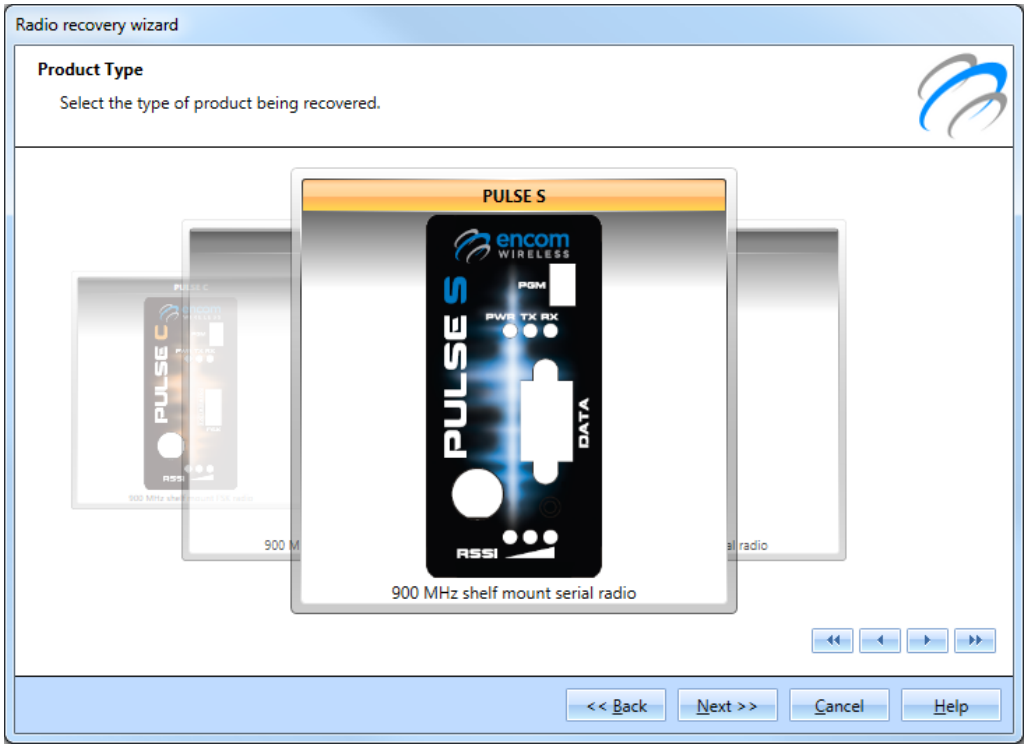
The wizard will display the list of PULSE radios that are supported by PULSE Link.




When an upgrade fails, the radio loses its identity. In order to recover it, you must select the appropriate model from the list. The model name is normally found on the front panel of the radio. Make sure that you choose the correct model, otherwise the radio may not operate properly.

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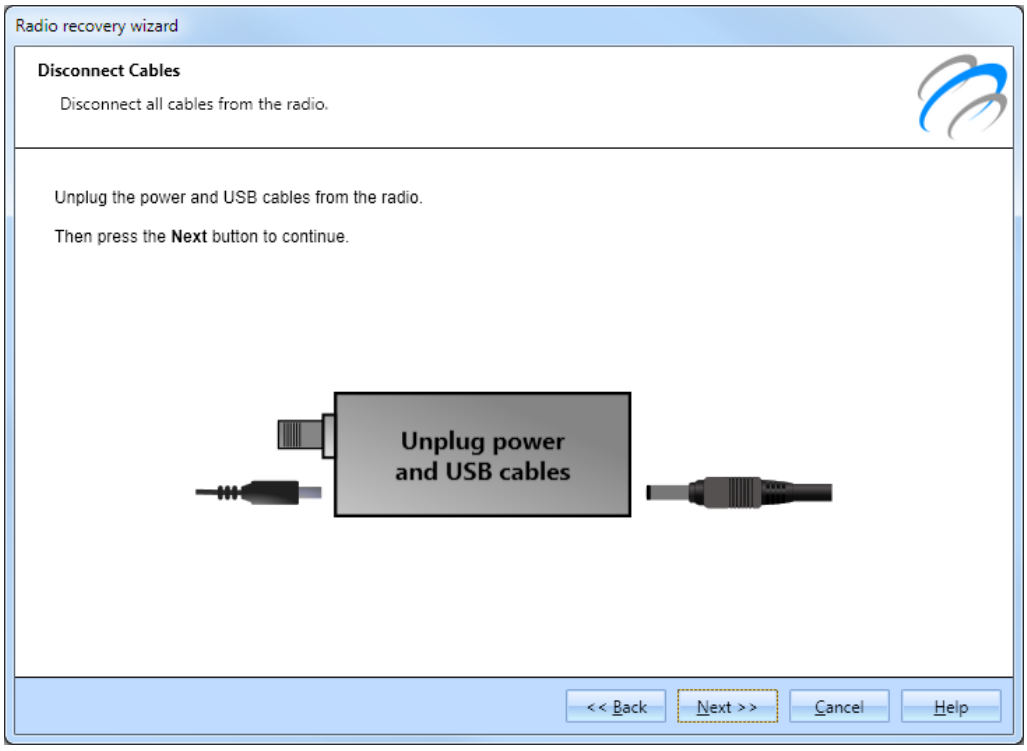
5. Select the appropriate radio model, and press **Next** to continue.

   The wizard will prompt you to disconnect all cables from the radio.

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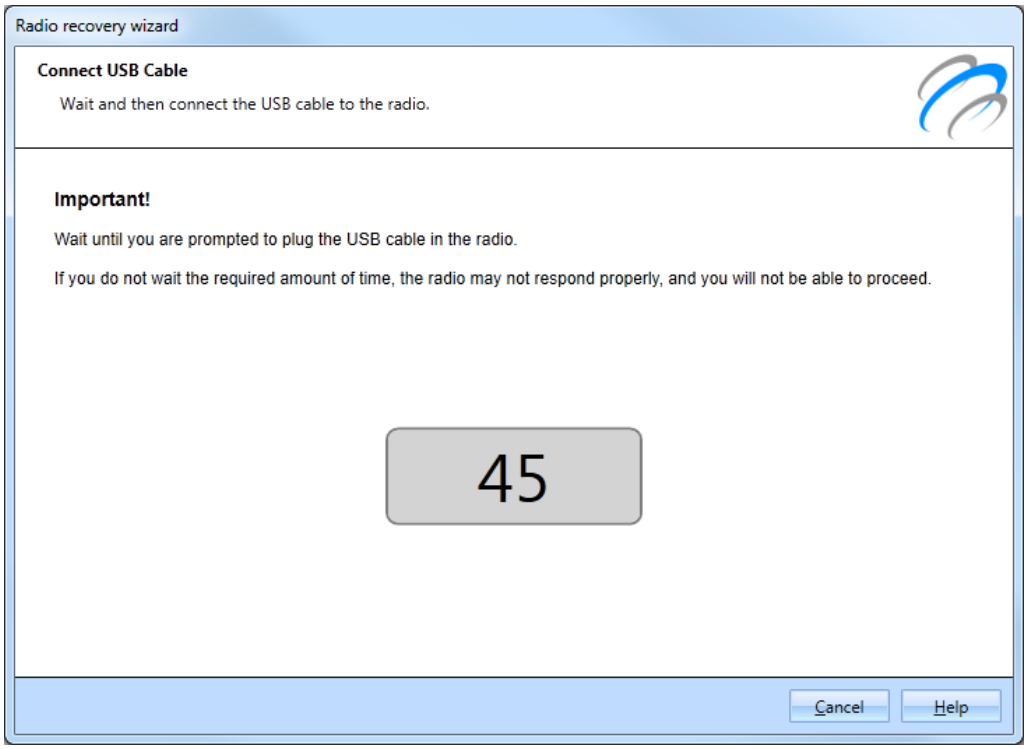
6. After you have disconnected both cables, press **Next**.

   A countdown timer will be displayed. The radio must be powered off for at least 60 seconds before proceeding.


Radio recovery wizard
Connect USB Cable
Wait and then connect the USB cable to the radio.
Important!
Wait until you are prompted to plug the USB cable in the radio.
If you do not wait the required amount of time, the radio may not respond properly, and you will not be able to proceed.
45
Cancel
Help

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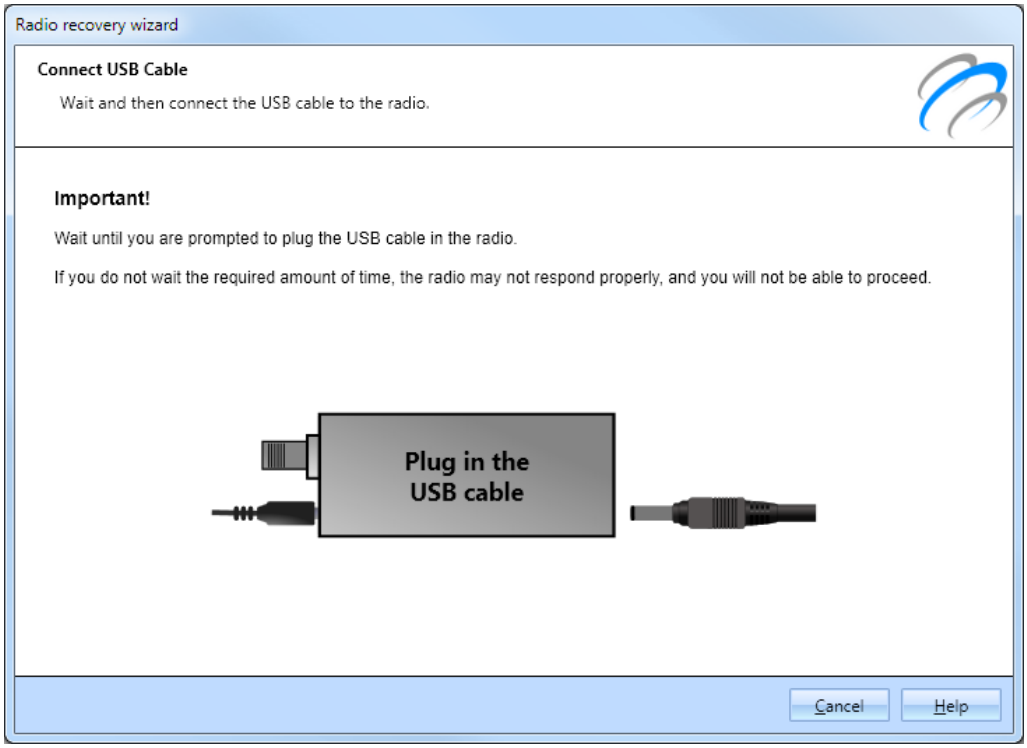
7. When the timer expires, the wizard will prompt you to plug in the USB cable.


Radio recovery wizard
Connect USB Cable
Wait and then connect the USB cable to the radio.
Important!
Wait until you are prompted to plug the USB cable in the radio.
If you do not wait the required amount of time, the radio may not respond properly, and you will not be able to proceed.
Plug in the USB cable
Cancel
Help

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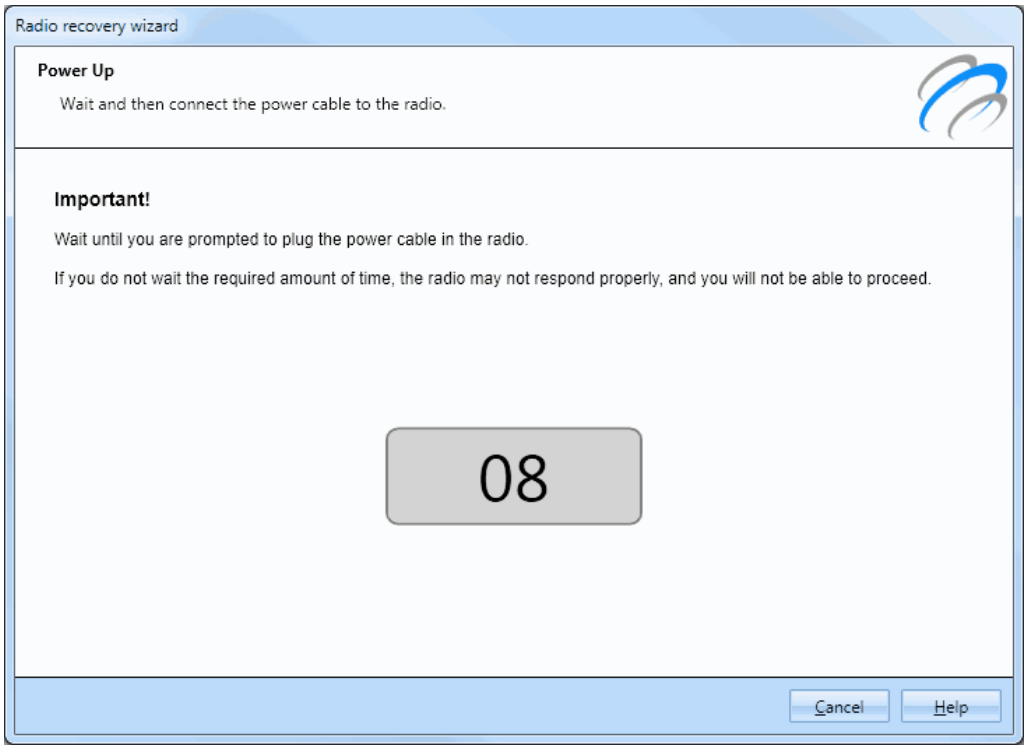
8. Plug in the USB cable. A second countdown timer will be displayed. Again, wait until the timer expires before proceeding.


Radio recovery wizard
Power Up
Wait and then connect the power cable to the radio.
Important!
Wait until you are prompted to plug the power cable in the radio.
If you do not wait the required amount of time, the radio may not respond properly, and you will not be able to proceed.
08
Cancel
Help

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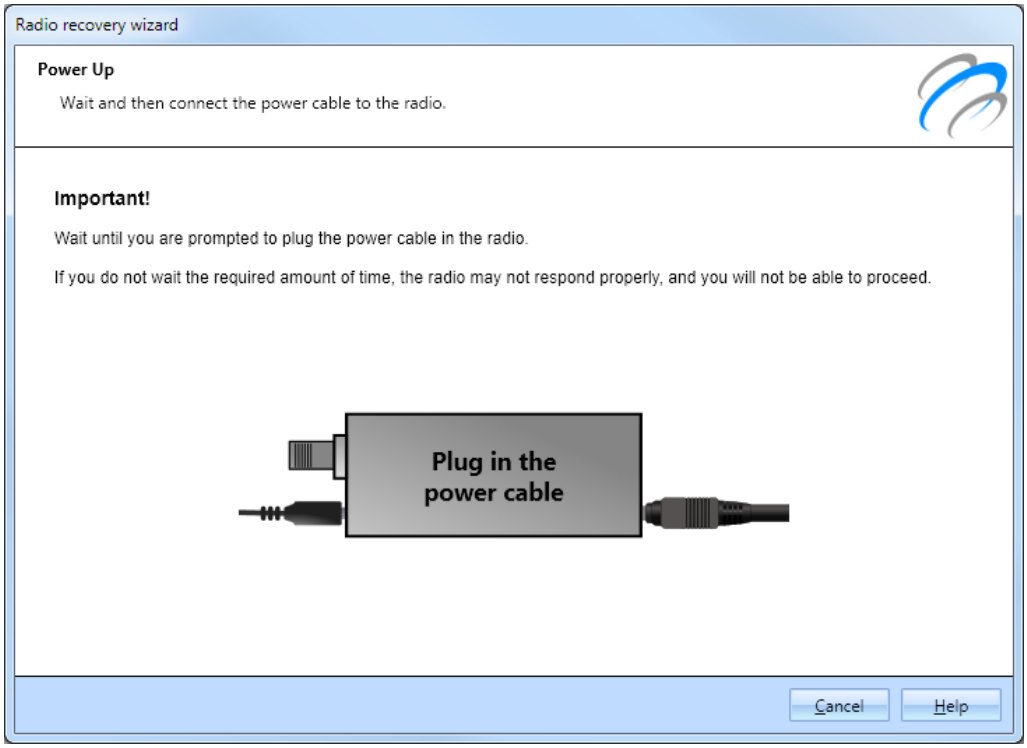
9. When the timer expires, the wizard will prompt you to plug in the power cable.


Radio recovery wizard
Power Up
Wait and then connect the power cable to the radio.
Important!
Wait until you are prompted to plug the power cable in the radio.
If you do not wait the required amount of time, the radio may not respond properly, and you will not be able to proceed.
Plug in the power cable
Cancel
Help

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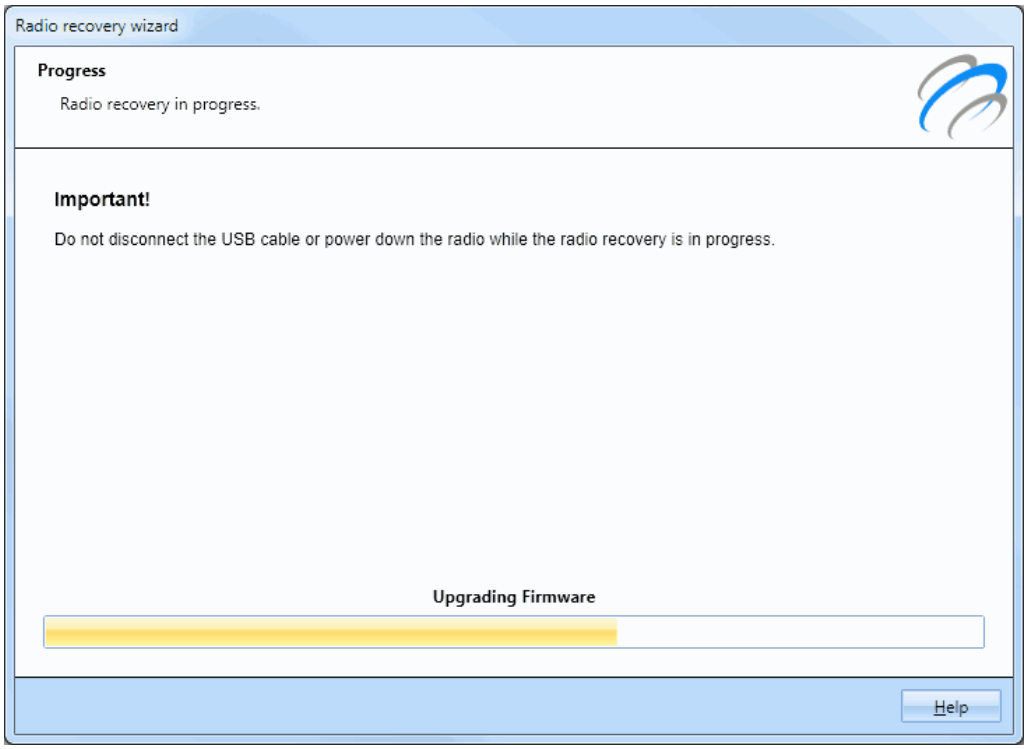
10. Plug in the power cable. The recovery process will start automatically.

The wizard will display a progress bar while the radio is loaded with the firmware.


Radio recovery wizard
Progress
Radio recovery in progress.
Important!
Do not disconnect the USB cable or power down the radio while the radio recovery is in progress.
Upgrading Firmware
Help

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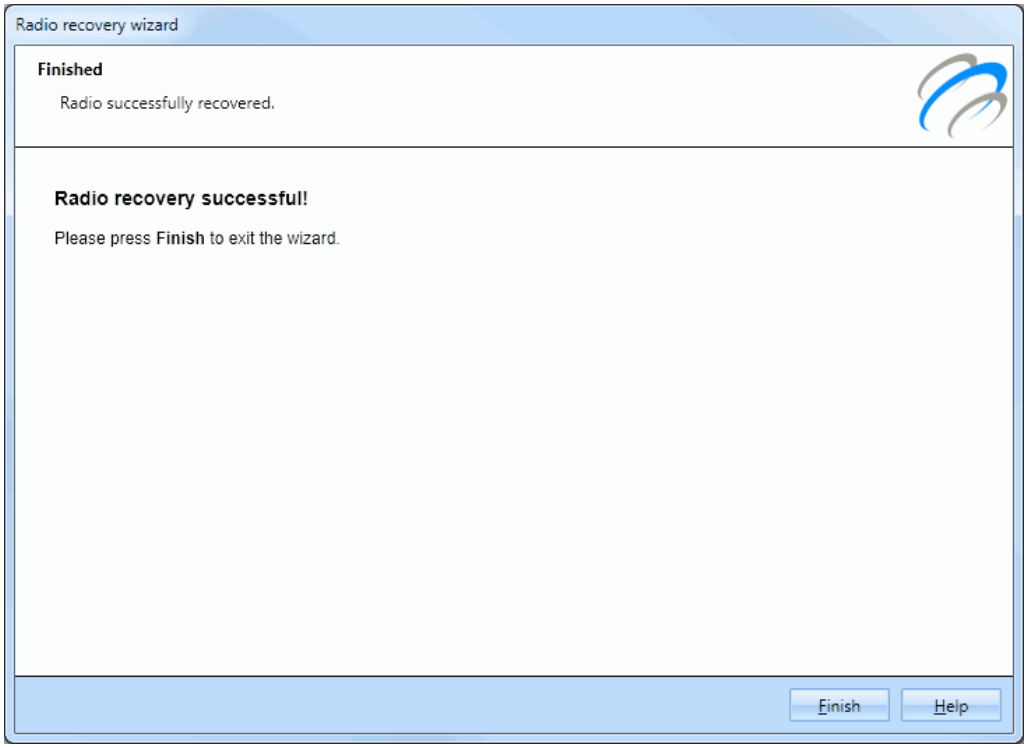
11. When the recovery process is complete, the wizard will display the following report:




12. Your radio is now recovered and ready to use. Click **Finish** to return to the main window.

| | |
|---|---|
| NOTE | If you recover a radio that contains an ECN-900 radio module, you will be asked to repeat steps 5 to 10. |

| | |
|---|---|
| NOTE | The latest available version of the radio firmware will be installed when a radio is recovered. |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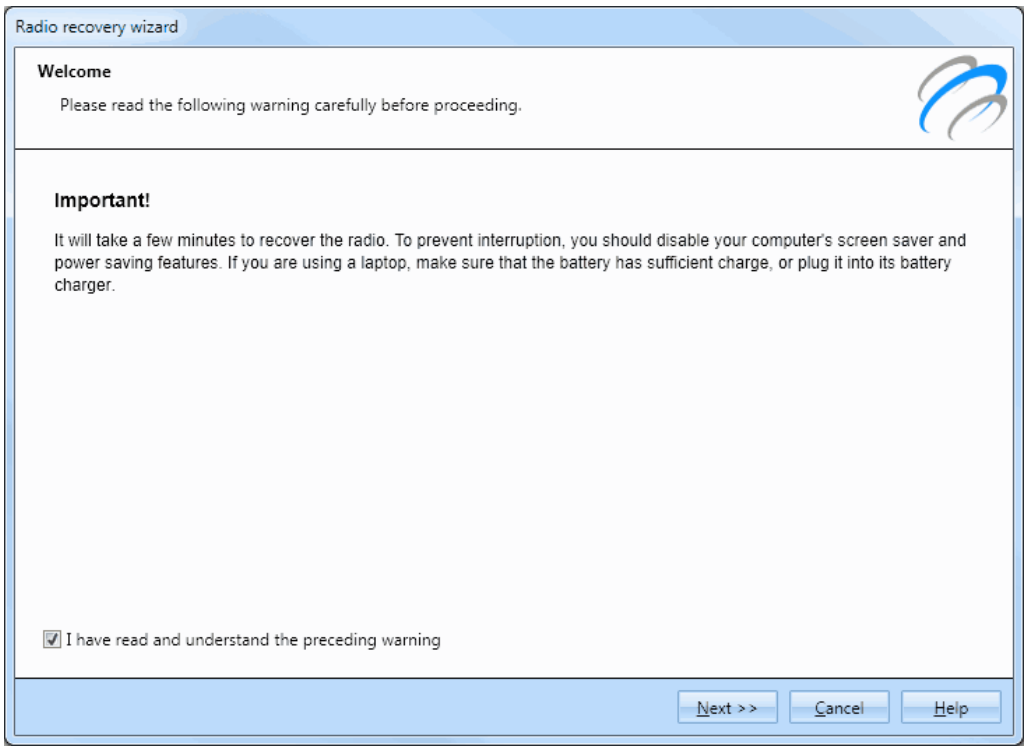
**Recovering a 5000 Series Radio**

To recover a 5000 series radio in which a 5000 series adapter card has been installed:

1. Make sure that the radio is powered, and then connect it to your computer via a serial or serial-to-USB cable.
2. Select **Recover** from the **Radio** menu. The *Radio recovery wizard* form is displayed:


Radio recovery wizard
Welcome
Please read the following warning carefully before proceeding.
Important!
It will take a few minutes to recover the radio. To prevent interruption, you should disable your computer's screen saver and power saving features. If you are using a laptop, make sure that the battery has sufficient charge, or plug it into its battery charger.
I have read and understand the preceding warning
Next >>
Cancel
Help

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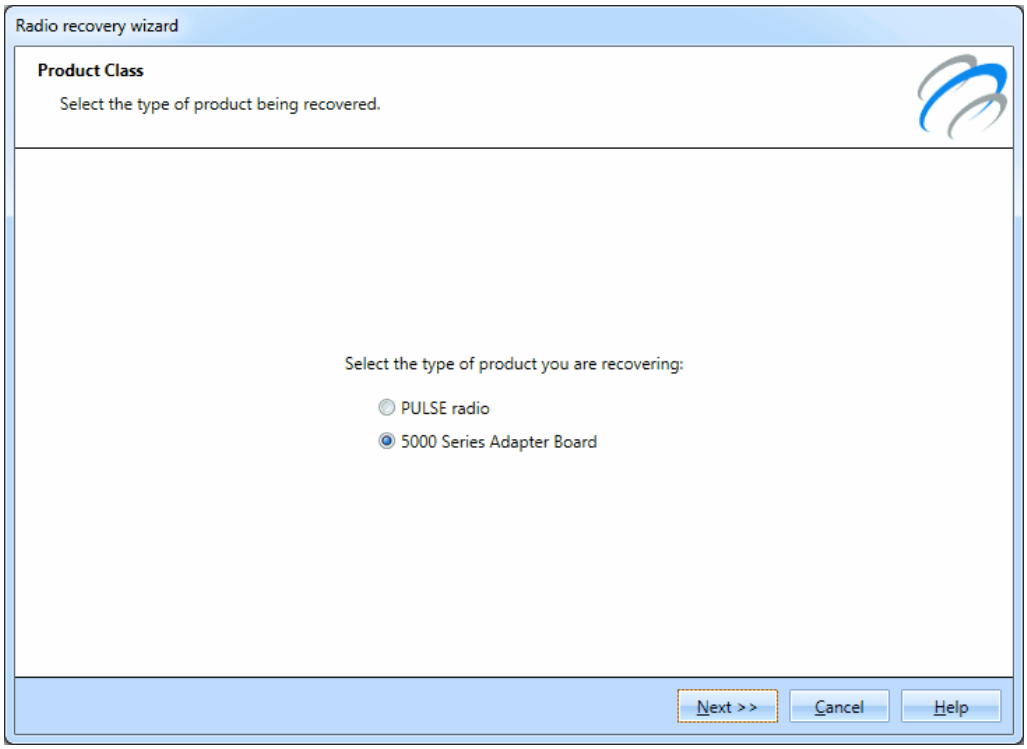
3. Check the **I have read and understand the preceding warning** option, and then click **Next** to continue.

   The wizard will display the type of products that are supported by PULSE Link.




4. Select the **5000 Series Adapter Board** option, then then click **Next** to continue.

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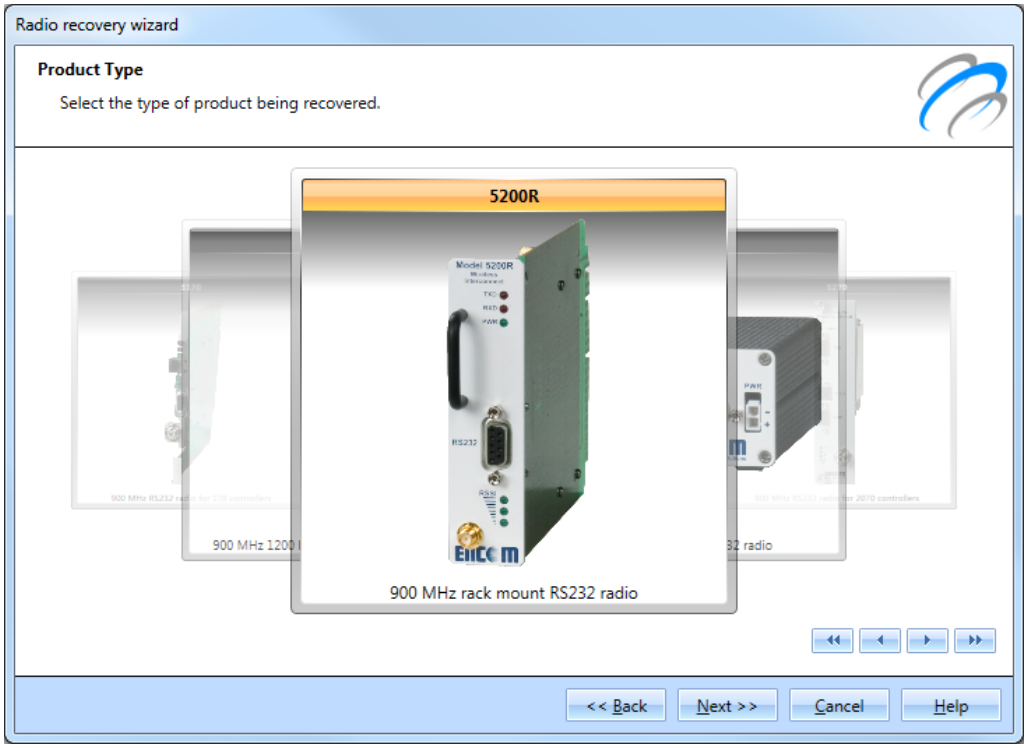
The wizard will display the list of 5000 series radios that are supported by PULSE Link.




When an upgrade fails, the radio loses its identity. In order to recover it, you must select the appropriate model from the list. The model name is normally found on the front panel of the radio. Make sure that you choose the correct model, otherwise the radio may not operate properly.

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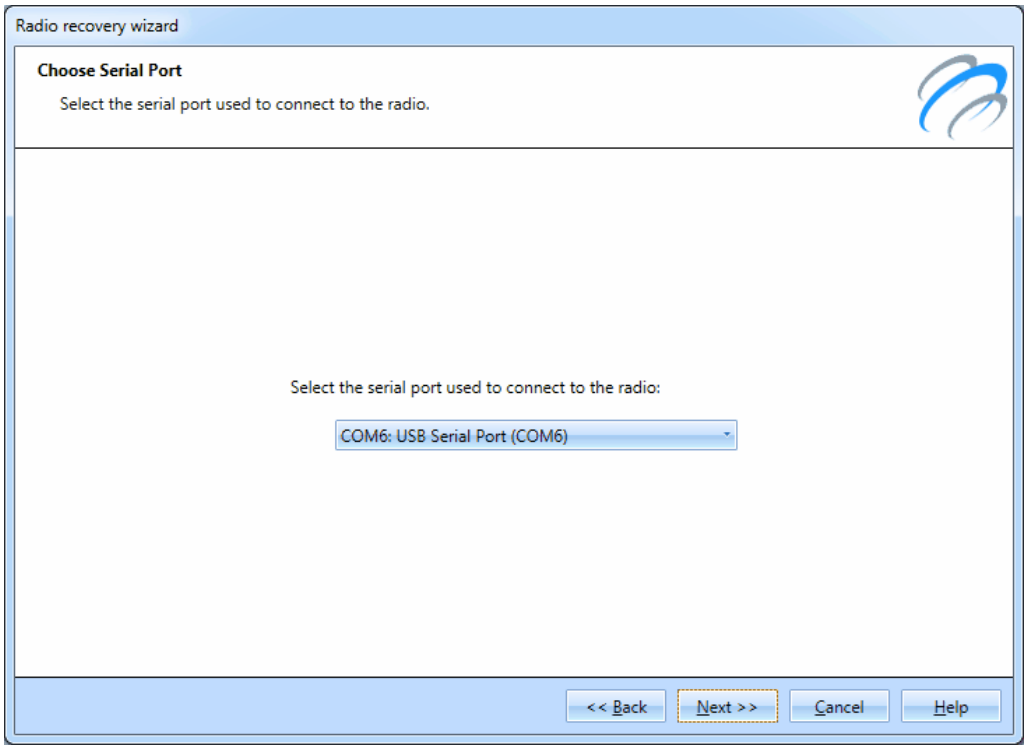
5. Select the appropriate radio model, and press **Next** to continue.

   The wizard will display the list of serial ports available on your computer.


Radio recovery wizard
Choose Serial Port
Select the serial port used to connect to the radio.
Select the serial port used to connect to the radio:
COM6: USB Serial Port (COM6)
<< Back
Next >>
Cancel
Help

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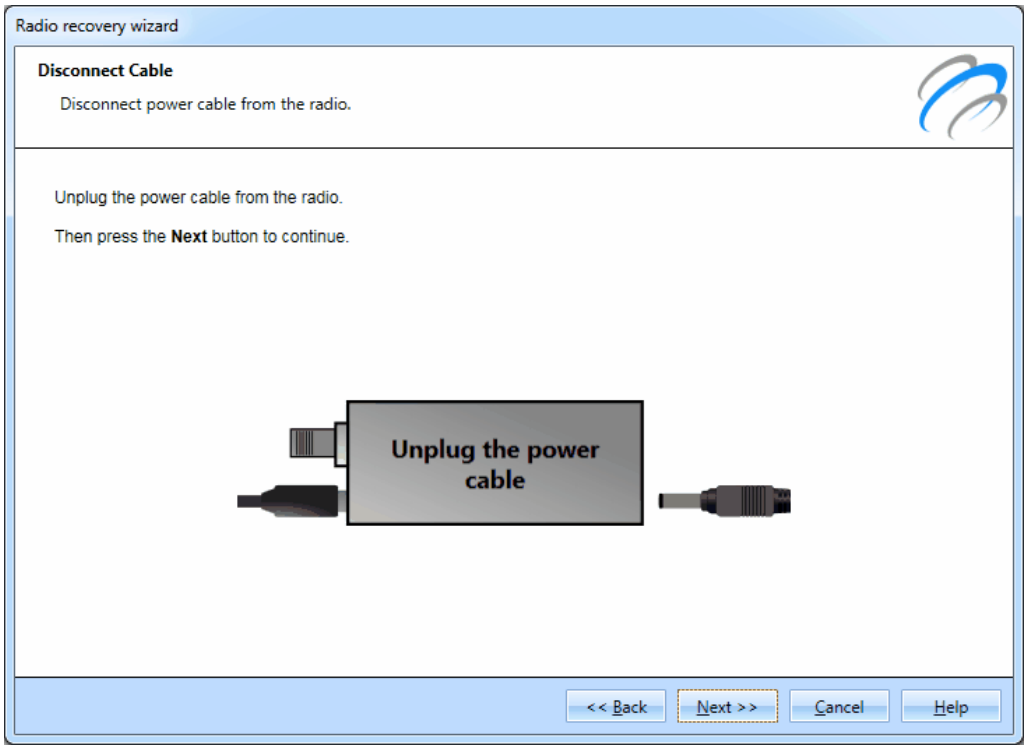
6. Select the serial port to which the radio is connected, and press **Next** to continue.

   The wizard will prompt you to unplug the power cable from the radio.

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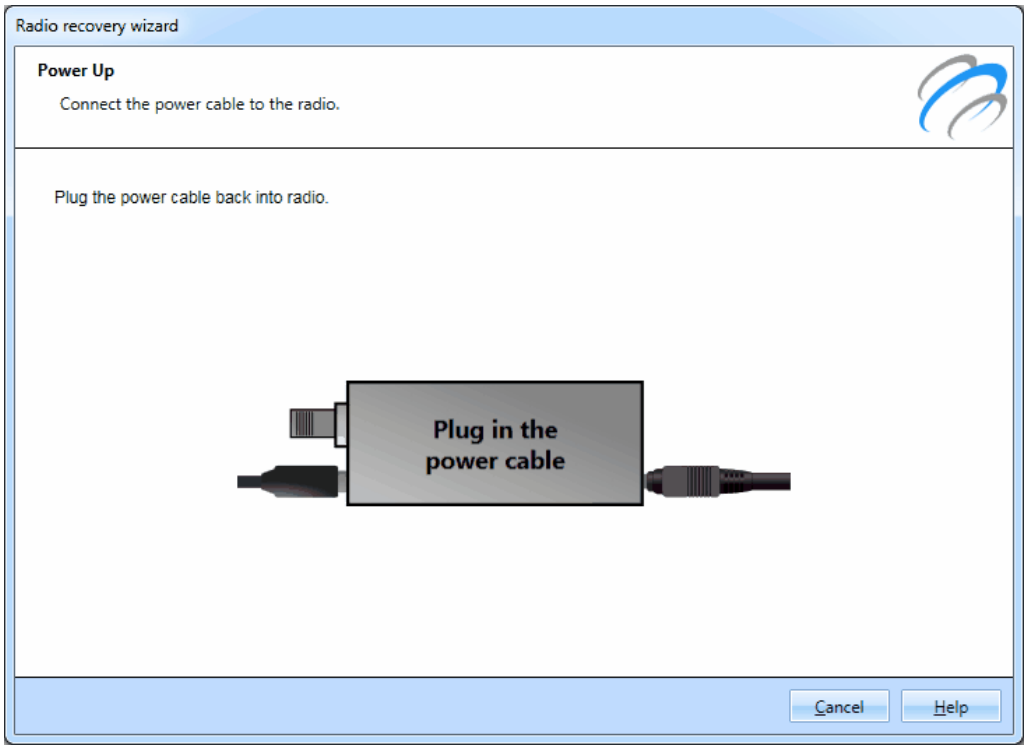
7. After you have disconnected the power cable, press **Next**.

   The wizard will prompt you to plug the power cable back in the radio.

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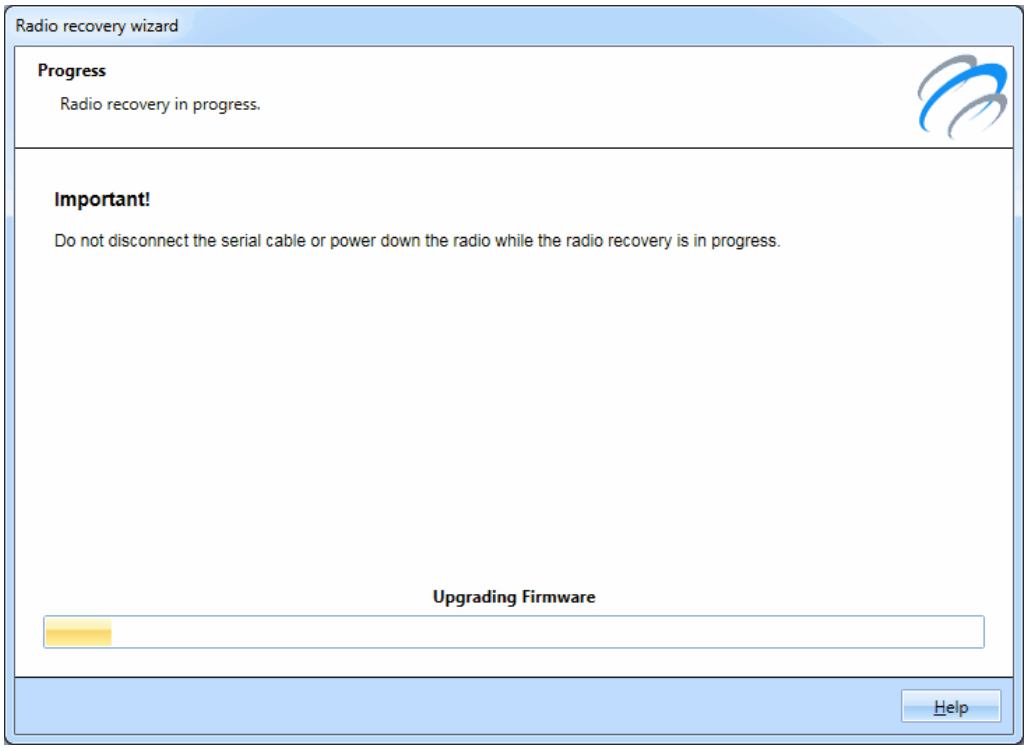
8. After you have plugged the power cable back in, press **Next**.

   The radio should be detected, and the recovery process will start:


Radio recovery wizard
Progress
Radio recovery in progress.
Important!
Do not disconnect the serial cable or power down the radio while the radio recovery is in progress.
Upgrading Firmware
Help

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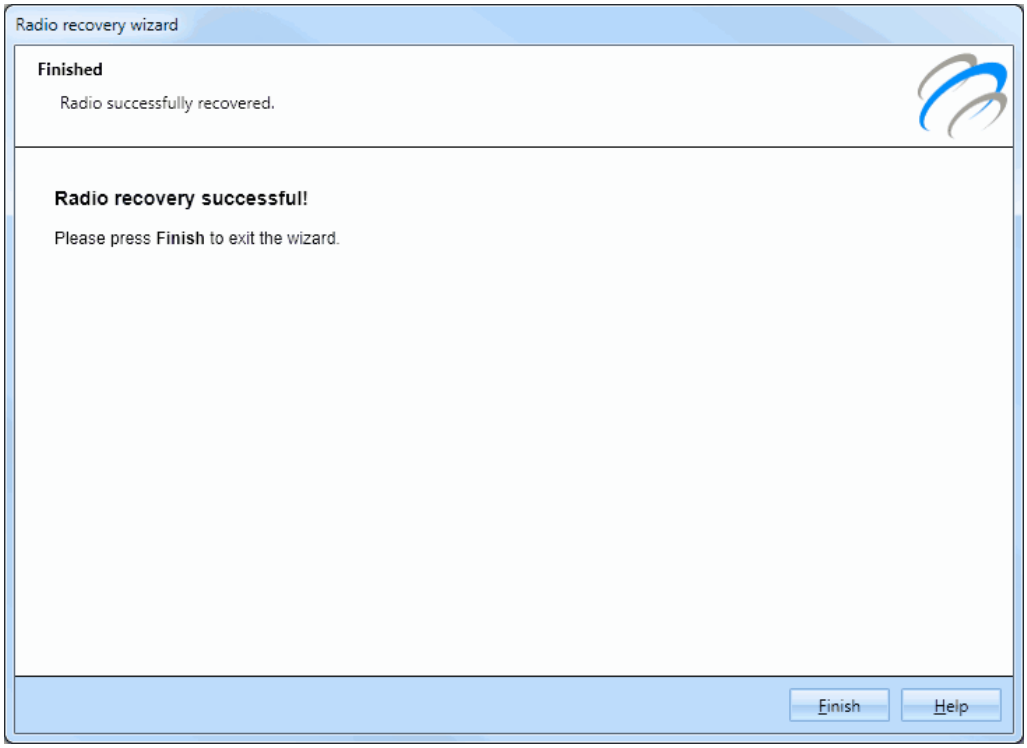
9. When the recovery process is complete, the wizard will display the following report:




10. Your radio is now recovered and ready to use. Click **Finish** to return to the main window.

| NOTE | The latest available version of the radio firmware will be installed when a radio is recovered. |
|---|---|

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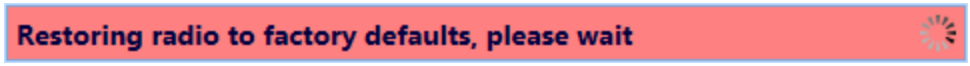
**Restore to Factory Defaults**

Select **Restore to Factory Defaults** from the **Radio** menu to restore the configuration of a radio to its factory default state.

The status indicator will display a message while the radio's configuration settings are being reset.




Note that when the status bar is red, you should not disconnect the USB, serial or Ethernet cable from the radio, nor should you remove power from the radio.

NOTE

When restoring an iPULSE radio to factory defaults, the existing IP address, network mask and default gateway settings will not be disturbed in order to prevent loss of communication with the radio.

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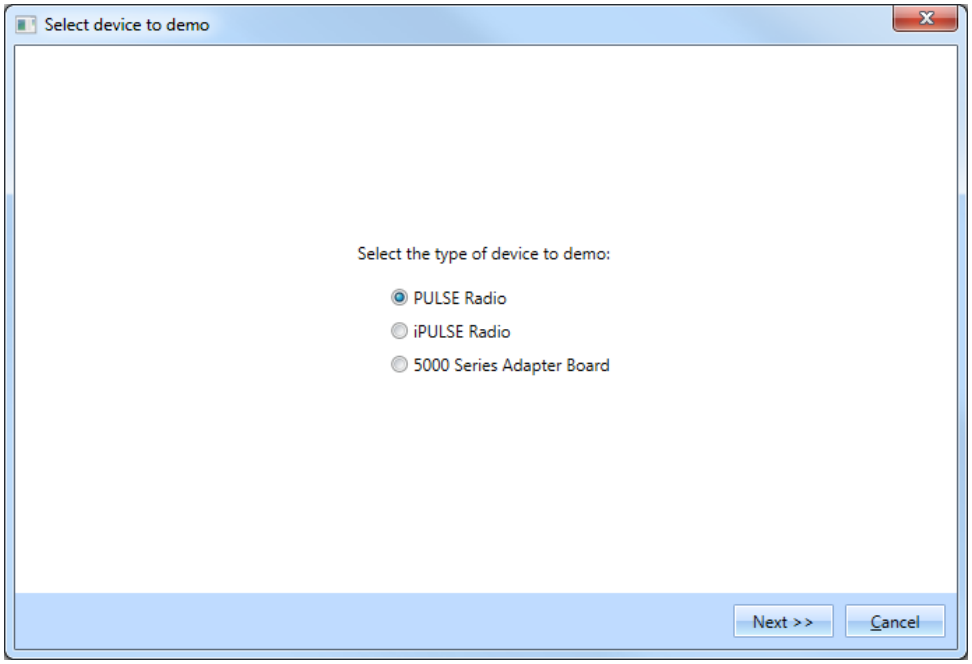
## Tools Menu Functions

### Demo Mode

Demo mode allows you to use the ENCOM PULSE Link application without being connected to a physical radio. It is useful for learning and evaluation purposes.

To activate demo mode:

1. Make sure that ENCOM PULSE Link is NOT connected a radio.
2. Select **Demo Mode** from the **Tools** menu. The *Select device to demo* form is displayed.

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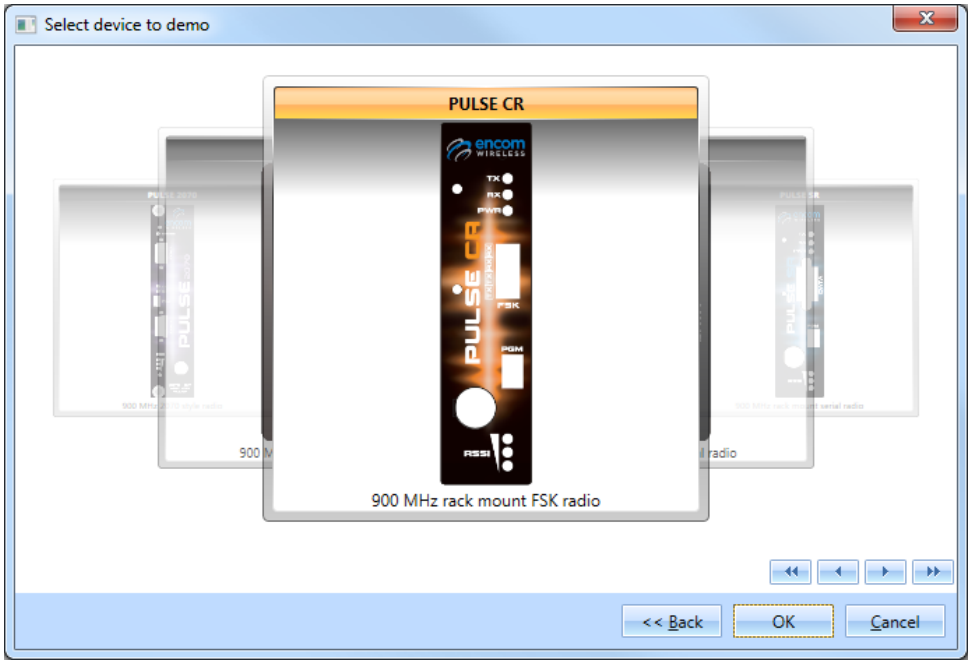
3. Select the type of device you want to demo, and then click the **Next** button. The list of available device models is displayed:




4. Select the radio model you want to demo, and press **OK** to continue.

   ENCOM PULSE Link will simulate the operation of acquiring the settings from the radio.

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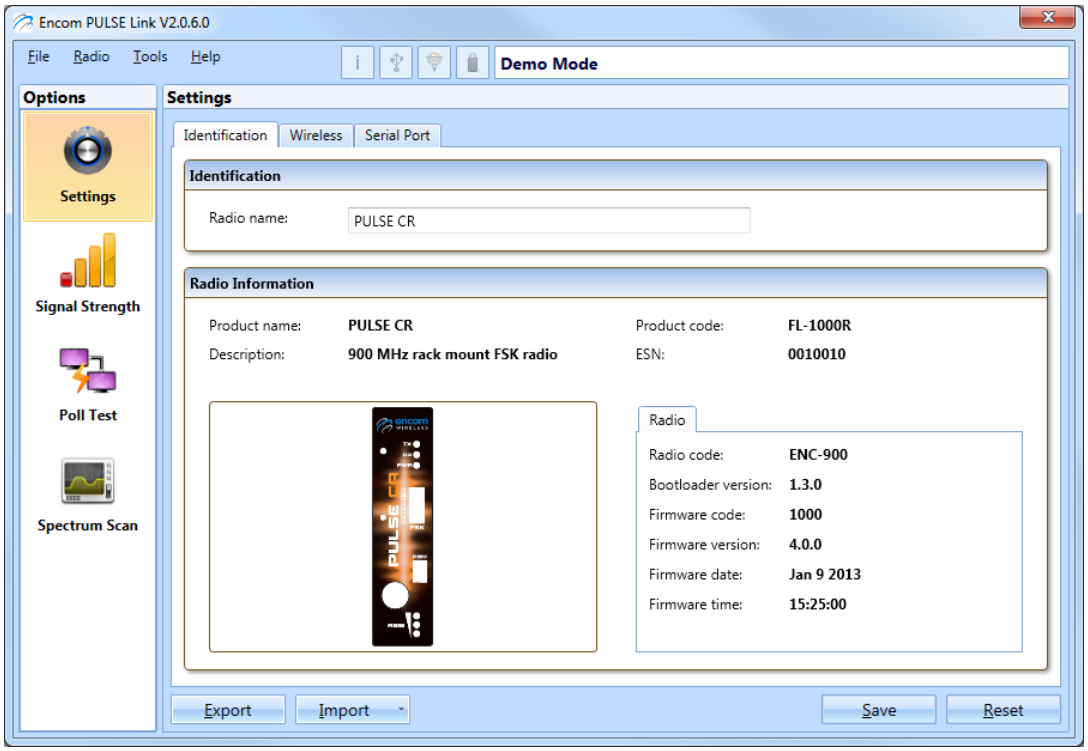
The settings for the selected radio model are then displayed in the application's main window:




5. At this point, you can carry out any function that can be used with a physical radio.

   ENCOM PULSE Link will simulate the operations you carry out to mimic physical radios as closely as possible (including the amount of time it takes to perform the various tasks).

6. To exit demo mode, select **Demo Mode** from the **Tools** menu again.

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## Help Menu Functions

### Topics

Select **Topics** from the **Help** menu to display the ENCOM PULSE Link on-line help.

### About

Select **About** from the **Help** menu to display information about the ENCOM PULSE Link application.

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## Status Bar

The status bar provides feedback on the current state of the PULSE Link application. It also contains a number of buttons that allow you to search for radios, and specify the communication parameters to use when communicating with a serial radio.

The following table briefly describes the items found in the status bar.

| Item | Description |
|---|---|
| | Search for iPULSE devices button.<br><br>Display a form that allows you to search for and select an iPULSE device.<br><br>See the Search for iPULSE Devices Button topic for more information. |
| | Detect USB devices button.<br><br>Resumes the detection of USB-based PULSE devices.<br><br>See Detect USB Devices Button topic for more information. |
| | Connect to serial device button.<br><br>Allows you to connect to a serial port based device, such as a 5000 series radio in which a 5000 series adapter board has been installed.<br><br>See the Connect to serial device button topic for more information. |
| | USB serial port settings button.<br><br>Allows you to set the serial port settings that ENCOM PULSE Link will use to communicate with a PULSE radio.<br><br>See the USB Serial Port Settings Button topic for more information. |


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| | |
|---|---|
| | Status information panel.<br><br>Provides feedback on the current state of the ENCOM PULSE Link application<br><br>See the Status Information Panel topic for more information. |

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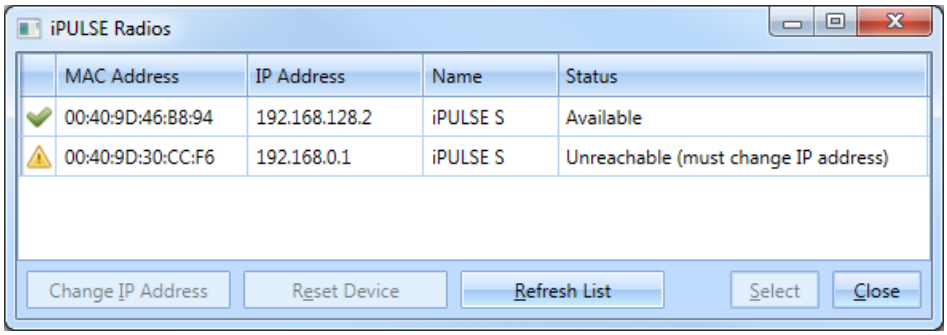
### Search for iPULSE Radios Button

Click the **Search for iPULSE devices** button, , at the left of the status information panel to display the *iPULSE Radios* form:




The *iPULSE Radios* form displays the iPULSE radios that are active on your local network. To load the configuration associated a specific radio, perform one of the following:

- Click the left mouse button on a radio that is available, and then click the **Select** button.
- Double-click the left mouse button on a radio that is available.

Refer to the Connecting to an iPULSE Radio topic for detailed information on the *iPULSE Radios* form.

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### Detect USB Devices Button

Click the **Detect USB devices** button, , at the left of the status information panel to re-enable the process that detects USB-based PULSE radios.

When an iPULSE radio configuration is loaded into the PULSE Link application, the process that detects USB-based PULSE radios is disabled.

When you are done working with iPULSE radios, and wish to connect to a USB-based PULSE radio, simply click on the **Detect USB devices** button.

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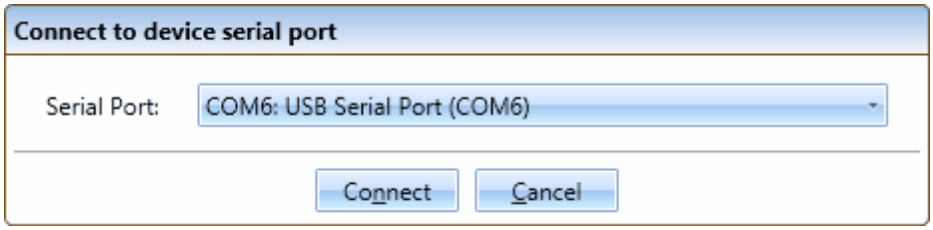
### Connect to serial device button

Click the **Connect to serial device** button, , at the left of the status information panel to connect to a serial port based radio.

When you click on the **Connect to serial device** button, the *Connect to device serial port* form is displayed.




Select the serial communications port to which the radio is connected, and then click the **Connect** button.

ENCOM PULSE Link will then connect to the radio and load its configuration.

Refer to the Connecting to a 5000 Series Radio topic for detailed information on connecting to a serial radio.

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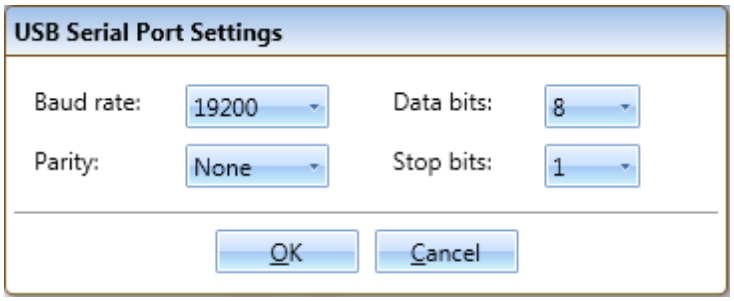
### USB Serial Port Settings Button

Click the **USB Serial Port Settings** button, , at the left of the status information panel to configure the serial port that ENCOM PULSE Link will use to communicate with a PULSE radio.

To change the serial communication settings:

1. While ENCOM PULSE Link is not currently connected to a PULSE radio, click the **USB Serial Port Settings** button. (You can also do this while PULSE Link is searching for the communication settings of a PULSE radio that is plugged into the USB port). The *USB Serial Port Settings* form is displayed.




2. Change the settings to match your radio's currently configured serial port settings, and then click **OK**.
3. ENCOM PULSE Link will attempt to use the specified settings to communicate with the radio.

| NOTE | If ENCOM PULSE Link can't communicate with the radio using the settings you specify, it will keep trying to communicate using all possible combinations of communication settings. |
|---|---|

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### Status Information Panel

The status information panel provides feedback on the current state of the ENCOM PULSE Link application.

The spinner at the right of the status panel, , indicates that the application is currently interacting with a radio.

Under normal operation, the background of the status bar is white. When the application is communicating with the radio, the background turns red.

When the background is red, you will not be able to shut down ENCOM PULSE Link. You should refrain from powering off the radio or disconnecting the USB cable while the application is in this state. Doing so when connected to a PULSE radio could prevent the radio from being able to communicate properly over the serial port (or the FSK port for FSK radios). If this happens, you may have to use PULSE Link to restore the radio's configuration.

The following table describes the messages that can be displayed in the status panel:

| Message | Description |
|---|---|
| Attempting to communicate at 1200 baud, 8N1 | Displayed when the application is attempting to communicate with the radio. |
| Connect to radio using USB or Ethernet cable | Displayed if there is no radio connected to your computer.<br>Use a USB cable connect to a PULSE radio, and an Ethernet cable to connect to an iPULSE radio. |
| Could not communicate with radio | ENCOM PULSE Link was able to detect the radio, but was not able to communicate with it.<br>This error normally indicates that another application is using the USB serial port used to communicate with a PULSE radio.<br>It may also indicate a hardware problem with the radio, or a radio that was not designed to be used with ENCOM PULSE Link. |
| Could not get radio settings, please try again | An error occurred trying to get the radio settings.<br>For PULSE radios, unplug the USB and power cables from |

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| | |
|---|---|
| | the radio, wait a minute, and plug them back in. The radio should be detected, and its configuration automatically loaded.<br>For iPULSE radios, unplug the Ethernet and power cables from the radio, wait a minute, plug them back in, click the Search for iPULSE devices button, select the radio in the iPulse Radios form, and click the **Load** button to load the radio's configuration.<br>Contact your ENCOM customer service representative if the problem persists. |
| Could not update radio settings, please try again | An error occurred trying to update the radio settings.<br>For PULSE radios, unplug the USB and power cables from the radio, wait a minute, plug them back in, wait for the radio's configuration to be loaded, and then try again.<br>For iPULSE radios, unplug the Ethernet and power cables from the radio, wait a minute, plug them back in, click the Search for iPULSE devices button, select the radio in the iPulse Radios form, click the **Load** button to load the radio's configuration, and then try again.<br>Contact your ENCOM customer service representative if the problem persists. |
| Demo mode | The application is currently running in demo mode. |
| Getting radio settings, please wait | Displayed while the application is getting the settings from the radio. Do not disconnect the radio while the application is in this state. |
| Incompatible radio found | ENCOM PULSE Link was able to communicate with the radio, but determined that it is not able to support it.<br>You may need to upgrade to the latest version of ENCOM PULSE Link, or use a different application that was designed to support the radio. |
| iPULSE radio on-line (192.168.0.1) | The application is connected to an iPULSE radio that has the specified IP address. |
| Multiple radios found, please unplug all but one | ENCOM PULSE Link can only manage one USB-based PULSE radio at a time. Unplug all other PULSE radios in order to proceed. |
| Radio detected, attempting to communicate | ENCOM PULSE Link has detected a radio on the USB port, and is currently trying to communicate with it. |

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| | |
|---|---|
| Radio on-line | The application is connected to a PULSE radio, but is not currently interacting with it. |
| Recovering radio | The *Radio recovery wizard* is currently active. See the Radio -> Recover topic for more information. |
| Restoring radio to factory defaults, please wait | Displayed while the radio's configuration is being restored to factory defaults. Do not disconnect the radio while the application is in this state. |
| Searching for iPULSE radios | The iPULSE Radios form is currently active, and ENCOM PULSE Link is searching for iPULSE radios on the local network. |
| Updating radio settings, please wait | Displayed while the application is updating the radio settings. Do not disconnect the radio while the application is in this state. |
| Upgrading radio | The *Firmware upgrade wizard* is currently active. See the Radio -> Upgrade topic for more information. |


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## Options List

The options list allows you to access the various functions of ENCOM PULSE Link. Click on the desired option to display the associated user interface in the PULSE Link workspace area.

Refer to the following topics for information on each of the options:

- Settings Panel
- Signal Strength Panel
- Poll Test Panel
- Spectrum Scan Panel

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## Settings Panel

The **Settings** panel shows the configuration settings of the serial radio that is currently connected to your computer.

The configuration settings are logically grouped using a tabbed interface. The following topics describe the settings found in each tab:

- Identification Tab
- Wireless Tab
- Network Tab
- Serial Port Tab

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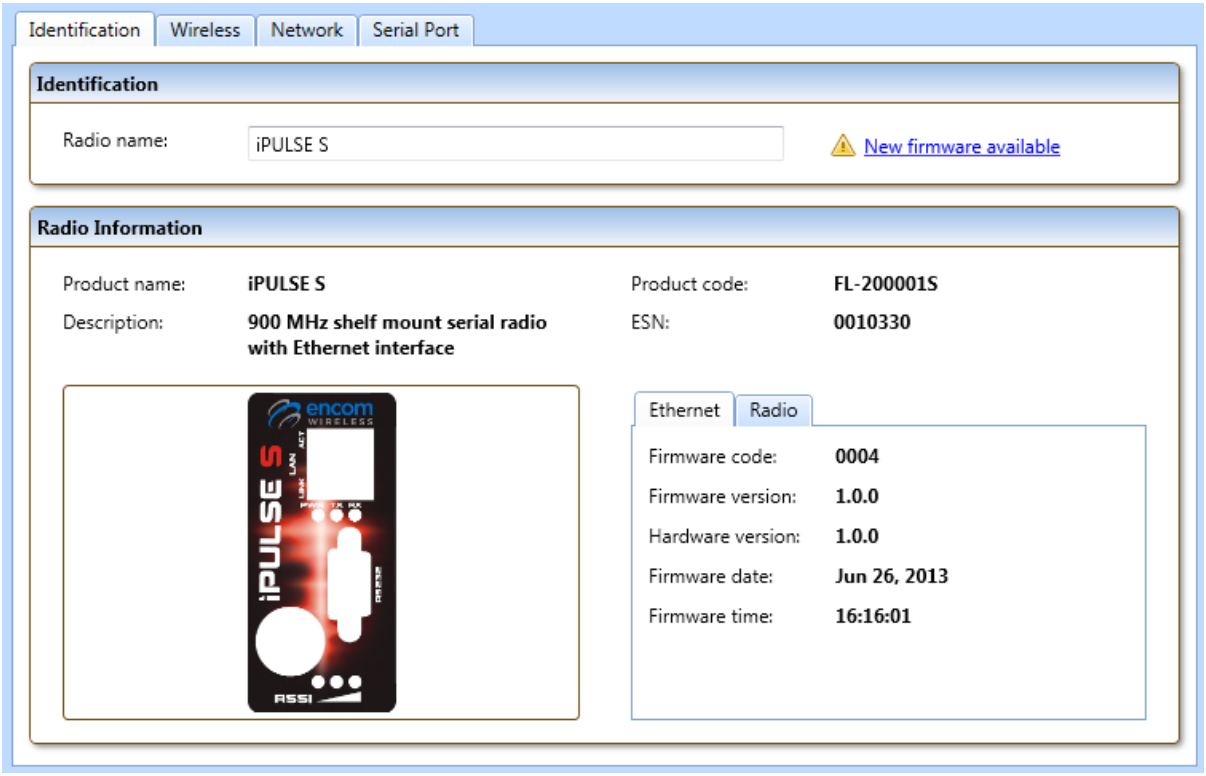
### Identification Tab

The *Identification* tab displays information on the radio that is connected to your computer. It also allows you to assign a friendly name to the radio.

The following screen shot shows the contents of the *Identification* tab for a typical serial radio.




The following tables describe the settings found in each group in the *Identification* tab.

| Identification | |
|---|---|
| **Field Name** | **Description** |
| Radio name | Enter a name used to identify the radio (up to a maximum of 15 characters for PULSE radios, and 50 characters for iPULSE radios). |
| New firmware available | Indicates that new radio firmware is available. Click on this link to display the Firmware upgrade wizard.<br>This indicator is not displayed if the radio's firmware is up to date.<br>Note that the indicator makes use of the firmware upgrade files that are packaged with the ENCOM PULSE Link setup program. In order to ensure that you have the latest firmware available, you should always have the latest version of ENCOM PULSE Link installed. |

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<table>
<tr><th colspan="2">Radio Information</th></tr>
<tr><th>Field Name</th><th>Description</th></tr>
<tr><td>Product name</td><td>The serial radio's model name.</td></tr>
<tr><td>Description</td><td>A short description of the radio's features.</td></tr>
<tr><td>Radio picture</td><td>A picture of the radio.<br>If the picture does not match the radio that is connected to your computer, the radio may not have been properly provisioned.<br>In this case, you can use the Radio -> Recover function to correct the discrepancy.</td></tr>
<tr><td>Product code</td><td>Internal code used to identify the serial radio model.</td></tr>
<tr><td>ESN</td><td>The electronic serial number that uniquely identifies the radio module.</td></tr>
<tr><td>Ethernet tab</td><td>Displays information associated with the radio's Ethernet interface (for iPULSE radios only):
<table>
<tr><th>Field Name</th><th>Description</th></tr>
<tr><td>Firmware code</td><td>Internal code used to identify the Ethernet interface firmware.</td></tr>
<tr><td>Firmware version</td><td>Version of the Ethernet interface firmware.</td></tr>
<tr><td>Hardware version</td><td>Version of the Ethernet interface hardware.</td></tr>
<tr><td>Firmware date</td><td>The date at which the Ethernet interface firmware was released.</td></tr>
<tr><td>Firmware time</td><td>The time at which the Ethernet interface firmware was released.</td></tr>
</table></td></tr>
<tr><td>Radio tab</td><td>Displays information associated with the radio's 900 MHz radio module:</td></tr>
</table>

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| Field Name | Description |
|---|---|
| Radio code | Identifies the type of wireless module embedded in the radio. |
| Bootloader version | Version of the radio's bootloader firmware. |
| Firmware code | Internal code used to identify the radio firmware. |
| Firmware version | Version of the radio's application firmware. |
| Firmware date | The date at which the radio's application firmware was released. |
| Firmware time | The time at which the radio's application firmware was released. |

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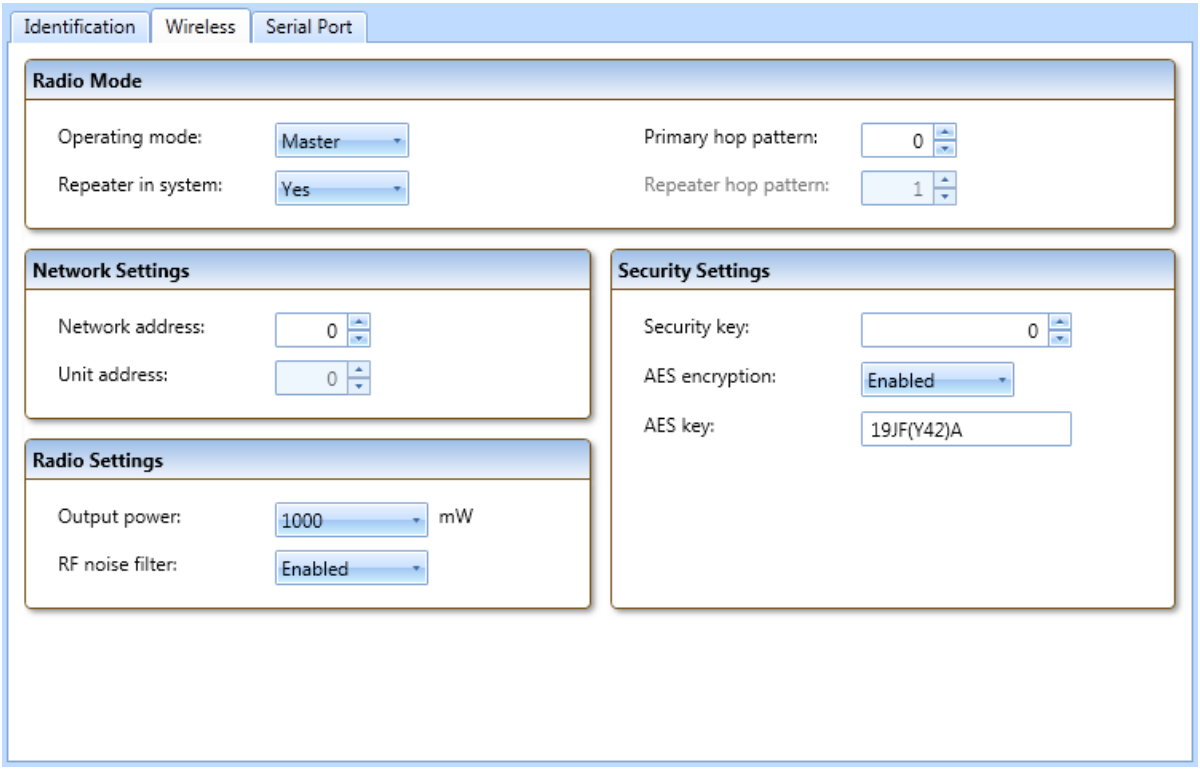
### Wireless Tab

The *Wireless* tab allows you to modify the radio's wireless settings.

The following screen shot shows the contents of the *Wireless* tab for a typical serial radio.




The following tables describe the settings found in each group in the *Wireless* tab.

| Radio Mode | |
|---|---|
| **Field Name** | **Description** |
| Operating mode | Specify the role of the radio in the network. |

| **Role** | **Description** |
|---|---|
| Master | The master radio normally has a direct, wired connection to a controller.<br><br>The master broadcasts data to the repeater and remote radios that make up the rest of the network.<br><br>It also collects the data transmitted by the |

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<table>
<tr><td></td><td>
<table>
<tr><td></td><td>remote and repeater radios, and forwards it to the network operations center.<br><br>In any given network, there is only one master.</td></tr>
<tr><td>Repeater</td><td>A repeater is used to extend the range of the master radio. Several repeaters can be chained together to span long distances.<br><br>The repeater can also be connected to a controller via its serial or FSK port.</td></tr>
<tr><td>Remote</td><td>A remote is normally connected to a controller via its serial or FSK port.<br><br>The remote communicates directly with the master, or with the closest repeater.</td></tr>
</table>
</td></tr>
<tr><td>Repeater in system</td><td>Set to Yes if one or more repeaters are present in your 900 MHz radio network.<br><br>Note that this setting is only applicable to the master radio. It is not displayed for the Repeater and Remote radios.</td></tr>
<tr><td>Primary hop pattern</td><td>ENCOM serial radios employ a frequency-hopping method of transmitting data. The radio's carrier frequency changes periodically according to one of 64 pseudo-random sequences.<br><br>In order for two radios to communicate with each other, they must be assigned the same hop pattern.<br><br>In a network with no repeaters, all radios must be assigned the same primary hop pattern.<br><br>In a network with repeaters, the master and the radios that communicate directly with it must be assigned the same primary hop pattern.<br><br>The radios that communicate directly with a repeater are assigned a primary hop pattern that matches the repeater's repeater hop pattern.<br><br>Refer to the PULSE Link Network Example topic for more information on assigning primary hop patterns.</td></tr>
<tr><td>Repeater hop pattern</td><td>This option is only available on repeater radios. It defines the hop pattern to use between a repeater and the radios that communicate directly with it.<br><br>The repeater's repeater hop pattern must be different than its primary hop pattern in order to prevent interference between the master-facing and remote-facing sides of the connection.</td></tr>
</table>

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| | |
|---|---|
| | Refer to the PULSE Link Network Example topic for more information on assigning secondary hop patterns. |

| Network Settings | |
|---|---|
| **Field Name** | **Description** |
| Network address | In order for the radios in a network to communicate with each other, they must be assigned the same network address.<br>If another ENCOM 900 MHz radio network was located next to an existing network, and both networks were using the same network address, there would be an opportunity for the two networks to interfere with each other. To prevent this, each of these networks should be assigned different network addresses. |
| Unit address | The unit address is used to identify the radios in the network. Each radio in the network should be assigned a different number.<br>By convention, the master is assigned a network address of 0. The remaining repeaters and remotes are assigned addresses between 1 and 254. |

| Radio Settings | |
|---|---|
| **Field Name** | **Description** |
| Output power | Select the power at which the radio will transmit.<br>ENCOM 900 MHz serial radios have very sensitive receivers that can operate at very low signal levels. It is recommended that the lowest power output necessary for a reliable connection be used. This will help with power consumption, and will prevent unnecessary interference with other devices operating within the same frequency band.<br>To determine the optimum power output, you should use the Signal Strength tool provided by ENCOM PULSE Link. Start with the highest power level, and decrease it until the signal strengths shown are between -40 and -90 dBm for both radios. |
| RF noise filter | The RF noise filter is used to improve radio performance when operating in a noisy RF environment.<br>When enabled, the RF noise filter will introduce about 6 dB of loss in the received signal strength. Because of this, the effective range of the radio will be shortened. |


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| Security Settings | |
|---|---|
| **Field Name** | **Description** |
| Security key | The security key is used to encrypt the communication between the radios, rendering the network more secure.<br>In order for the radios in a network to communicate with each other, they must be assigned the same security key.<br>A value between 0 and 2147483647 can be chosen.<br>For greater security, you should use a large number with randomly assigned digits. |
| AES encryption | If enabled, industry standard 128-bit AES encryption is applied to the communication between the radios. This provides the best network security possible for PULSE devices, although there may be a decrease in network performance.<br>This option is only available if the radio contains an ENC-901 (or newer) radio module. |
| AES key | The sequence of characters used to encrypt the communication between the radios.<br>For greatest security, enter a random collection of alphabetical, numeric and punctuation characters.<br>This option is only available if the radio contains an ENC-901 (or newer) radio module. |


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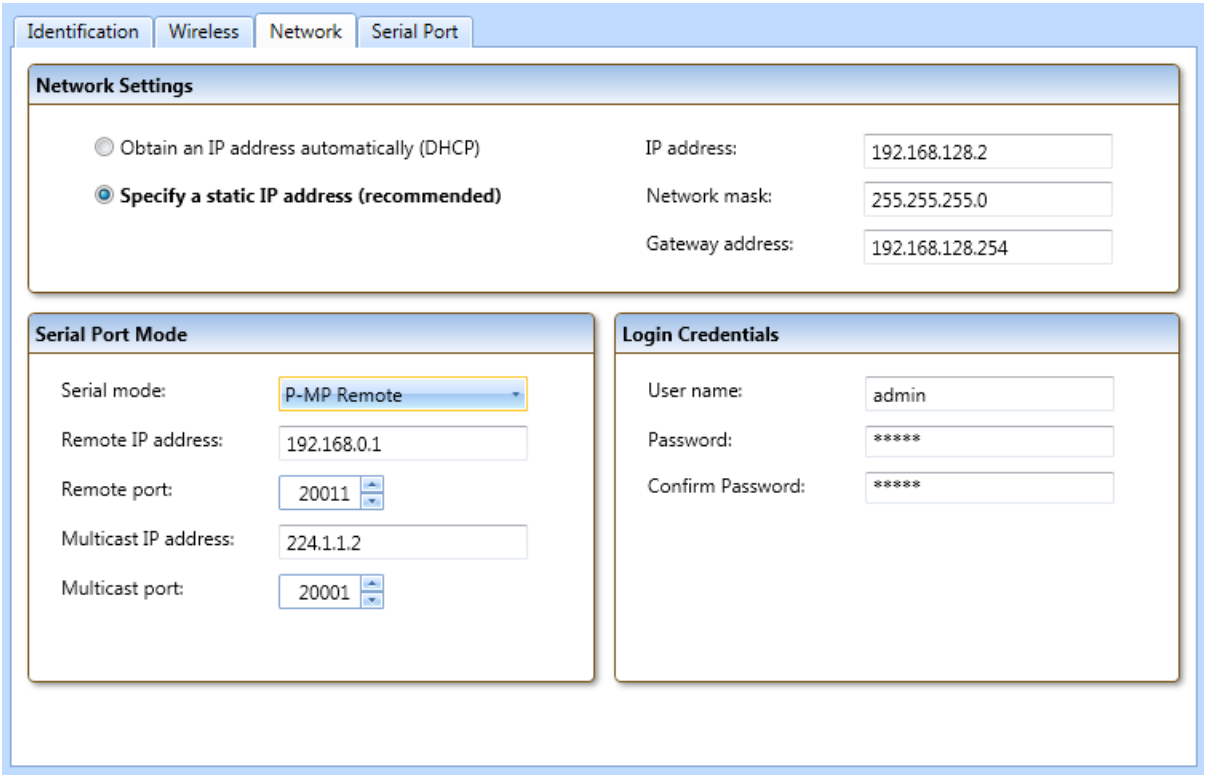
### Network Tab

The *Network* tab allows you to modify the settings associated with the radio's Ethernet port. This tab is only displayed for iPULSE radios.

The following screen shot shows the contents of the *Network* tab for a typical iPULSE radio.




The following tables describe the settings found in each group in the *Network* tab.

| Network Settings | |
|---|---|
| **Field Name** | **Description** |
| Obtain an IP address automatically (DHCP) | Select this option if a DHCP server is available on your radio network, and you want the DHCP server to assign an IP address to the radio.<br>Using the DHCP option is not recommended for radios installed in the field. The IP address assigned to the radio could change, or the DHCP server could fail and become unavailable. Both of these issues could cause loss of connectivity with the radio. |
| Specify a static IP address (recommended) | Select this option to manually assign the radio's IP address.<br>ENCOM recommends this option because it provides for a more stable network.<br>**Note:** It is important that each radio in the network is assigned a different |

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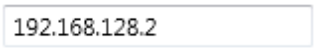
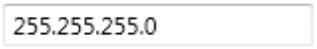
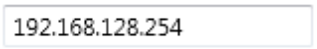
| | |
|---|---|
| | IP address. Network performance can suffer greatly if two or more radios are assigned the same IP address. |
| IP address | Enter the IP address of the radio. This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br>  |
| Network mask | Enter the network mask. This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br>  |
| Gateway address | Enter the IP address of the radio or router that allows the radio to connect with devices that are outside of their local LAN or VLAN. This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br>  <br>Note that the default gateway's IP address must be in the same subnet as the radio's IP address. |

## Serial Port Mode

| Field Name | Description |
|---|---|
| Serial Mode | This option sets the protocol used by the iPULSE radio to communicate with other devices (computer, iPULSE radio, TS1 terminal server, etc.) via the Ethernet port. One of the following options can be selected:<br><br>**Option** / **Description**<br>P-MP Master Mode: Allows the iPULSE radio to communicate with an unlimited number of iPULSE radios configured in P-MP Remote mode. The UDP protocol is used for low latency serial data transfer. This mode is extremely useful for typical "polling" type protocols.<br>See the P-MP Master Mode topic for more information. |

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| | |
|---|---|
| P-MP Remote Mode | Works with conjunction with an iPULSE radio configured in P-MP Master mode to provide low latency serial data transfer using the UDP protocol.<br><br>See the P-MP Remote Mode topic for more information. |
| TCP Server Mode | The radio waits for and accepts a connection from a device or computer application configured as a TCP client.<br><br>Up to four TCP clients can connect to a single TCP server.<br><br>See the TCP Server Mode topic for more information. |
| TCP Client Mode | The radio initiates and maintains a connection to a radio configured as a TCP server.<br><br>The connection acts as a virtual wire between two iPULSE networks.<br><br>See the TCP Client Mode topic for more information. |
| TCP Client & Server Mode | The radio can initiate a connection to, or accept a connection request from, another radio or computer that is configured in TCP Client or TCP Server mode.<br><br>See the TCP Client & Server Mode topic for more information. |
| VCOM UDP Mode | This mode is used in conjunction with a UDP based virtual COM port driver running on a computer.<br><br>The iPULSE radio is connected to the computer using its Ethernet interface, but appears as a local, physical COM port to an application running on the computer.<br><br>See the VCOM UDP Mode topic for more information. |

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| | |
|---|---|
| | The other fields that are displayed depend on the serial mode option that is selected. Refer to the appropriate topics for information on the configuration parameters associated with each option. |

| Login Credentials | |
|---|---|
| **Field Name** | **Description** |
| User name | The user name used to login to the radio.<br>The default user name is **admin**. |
| Password | The password used to login to the radio.<br>The default password is **admin**. |
| Confirm password | The password used to login to the radio. This must match the value entered in the **Password** field in order for the setting to be saved. |


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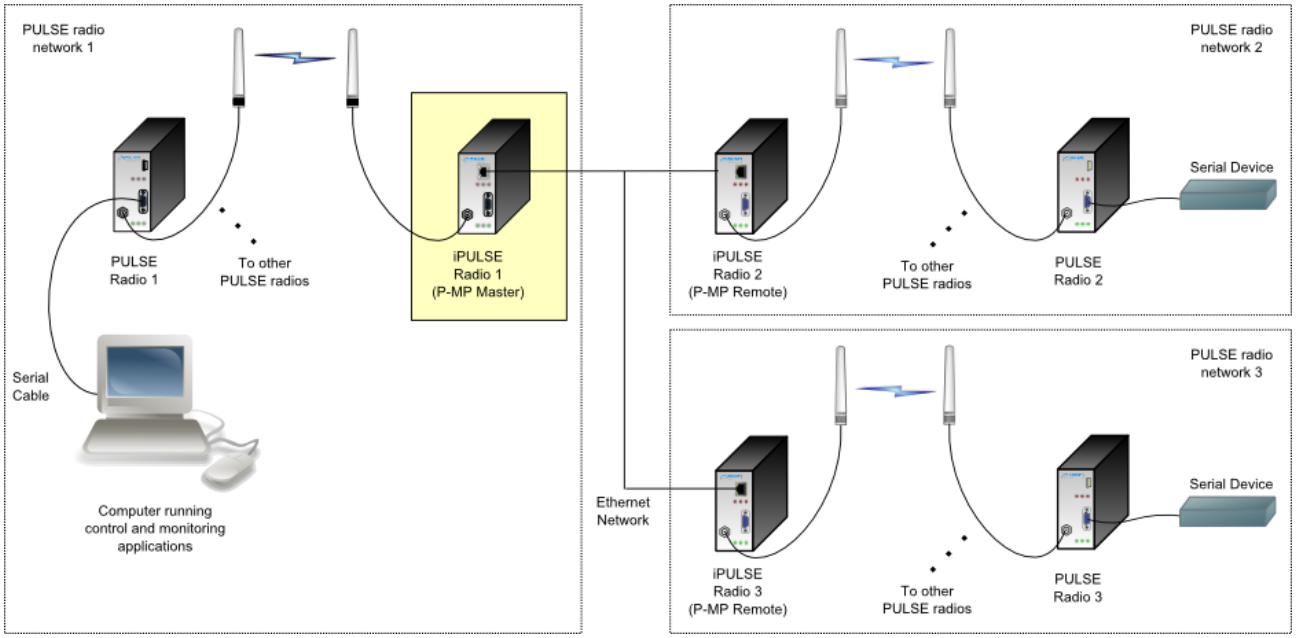
**P-MP Master Mode**

The P-MP (point-to-multipoint) mode is used to bridge an unlimited number of PULSE radio networks together. This allows serial devices from different PULSE networks to talk to each other via an Ethernet network. Data is transferred using low-latency UDP packets, making the solution ideal for polling applications.

The following diagram shows a typical context in which an iPULSE radio configured as a P-MP Master is used.




In this scenario, serial data from the application running on the computer is sent to an existing PULSE radio (PULSE radio 1), that relays the data to iPULSE radio 1. iPULSE radio 1, configured as a P-MP Master, encapsulates this data in UDP packets that are broadcast to the iPULSE radios configured as P-MP Remotes (iPULSE radio 2 and iPULSE radio 3). The P-MP remotes in turn relay the data to the PULSE radios in their respective networks.

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The following table describes the settings associated with the P-MP Master mode.

| Field Name | Description |
|---|---|
| Multicast IP address | Enter a multicast address to which UDP packets will be sent. This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br> <br><br>Set the **Multicast IP address** setting of the P-MP remote radios to this value.<br>Valid multicast addresses are in the range of 224.0.0.0 to 239.255.255.255.<br>The default address is 224.1.1.3. |
| Multicast port | Enter the port to which the multicast UDP packets will be sent.<br>Set the **Multicast port** setting of the P-MP remote radios to this value.<br>The default multicast port is 20001. |
| Listening port | Enter the port on which to listen for UDP packets coming from the remote radios.<br>Set the **Remote port** setting of the P-MP remote radios to this value.<br>The default listening port is 20011. |

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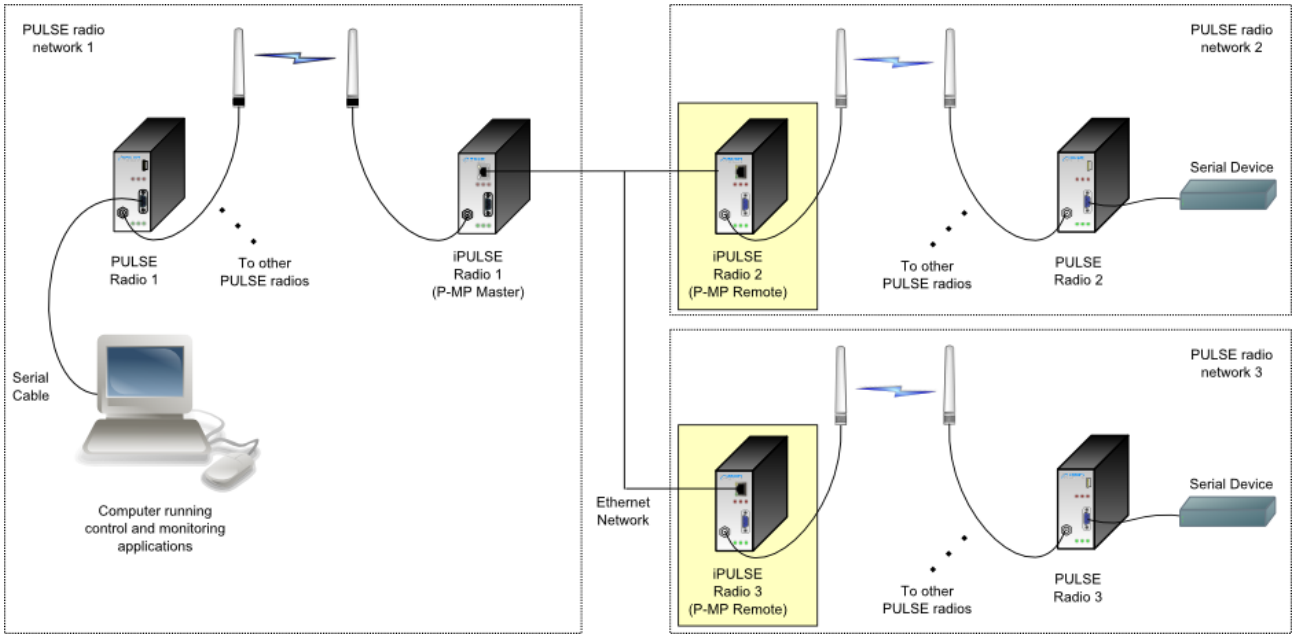
**P-MP Remote Mode**

The P-MP (point-to-multipoint) mode is used to bridge an unlimited number of PULSE radio networks together. This allows serial devices from different PULSE networks to talk to each other via an Ethernet network. Data is transferred using low-latency UDP packets, making the solution ideal for polling applications.

The following diagram shows a typical context in which iPULSE radios configured as a P-MP Remotes are used.




In this scenario, data coming from the serial devices in PULSE radio networks 2 and 3 are sent to iPULSE radio 2 and 3 respectively. iPULSE radio 2 and 3 are configured to relay this data, encapsulated in UDP packets, to iPULSE radio 1, that is configured as the P-MP Master. iPULSE radio 1 in turn relays the serial data to PULSE radio network 1, where it eventually reaches the application running on the computer.

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The following table describes the settings associated with the P-MP Remote mode.

| Field Name | Description |
|---|---|
| Remote IP address | Enter the IP address of the P-MP Master radio to which the P-MP Remote reports. The P-MP Remote radio will automatically send data received from its associated PULSE radio network to the P-MP Master.<br>The is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br> |
| Remote port | Enter the UDP port to which data received from the P-MP Remote radio's associated PULSE radio network will be sent.<br>Set this value to the **Listening port** setting of the P-MP Master radio.<br>The default listening port is 20011. |
| Multicast IP address | Enter the multicast address that the P-MP Remote radio listens to. This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br> <br>Set this value to the **Multicast IP address** setting of the P-MP Master radio.<br>Valid multicast addresses are in the range of 224.0.0.0 to 239.255.255.255.<br>The default address is 224.1.1.3. |
| Multicast port | Enter the UDP port on which the P-MP Remote listens for multicast packets.<br>Set this value to the **Multicast port** setting of the P-MP Master radio.<br>The default multicast port is 20001. |

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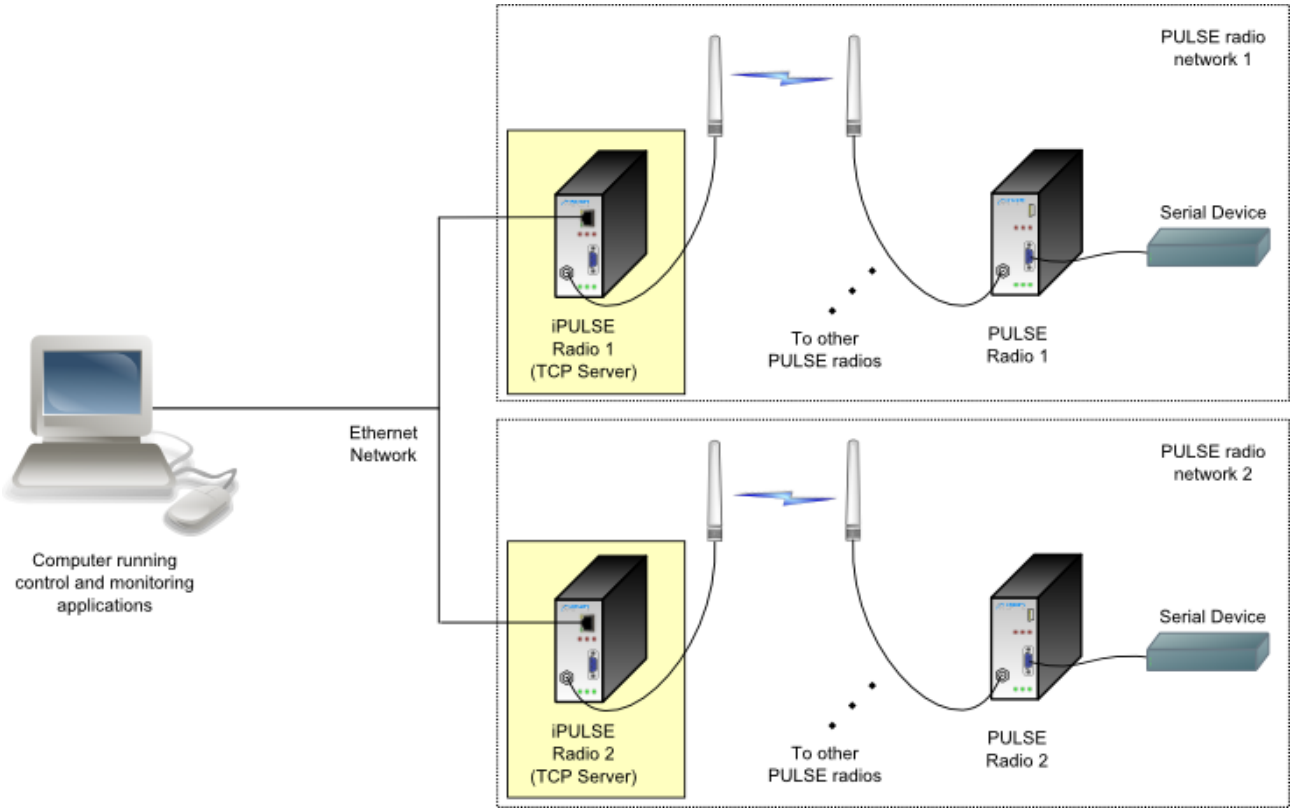
**TCP Server Mode**

The TCP Server mode is used to provide error-free communications between TCP clients, such as an application running on a computer, and serial devices found in a PULSE radio network. The TCP clients are connected to the iPULSE radios using a direct Ethernet connection. Up to four concurrent client connections are supported by each iPULSE radio.

The following diagram shows a typical context in which an iPULSE radio configured as a TCP Server is used.




In this scenario, an application running on a computer needs access to the serial devices in PULSE radio networks 1 and 2. The computer is connected to the iPULSE radios via their Ethernet ports. iPULSE radio 1 provides access to PULSE radio network 1, and iPULSE radio 2 provides access to PULSE radio network 2. The iPULSE radios are always listening for connection requests from a TCP client. The application running on the computer initiates separate TCP connections to the iPULSE radios as required. When a TCP connection is established, data can be sent to, and received from, the serial devices in the PULSE radio networks.

Note that in this scenario, it is not possible for a serial device in PULSE radio network 1 to communicate with a serial device in PULSE radio network 2 (and vice-versa).

The following table describes the settings associated with the TCP Server mode.

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| Field Name | Description |
|---|---|
| Listening port | Enter the TCP port on which the radio will listen for incoming connection requests.<br>The default listening port is 20011. |
| In-connection timeout | Enter the maximum amount of time, in seconds, to keep a connection active while it is idle (no data is being transferred). If this timeout is exceeded, the connection is dropped.<br>The default in-connection timeout is 300 seconds. |


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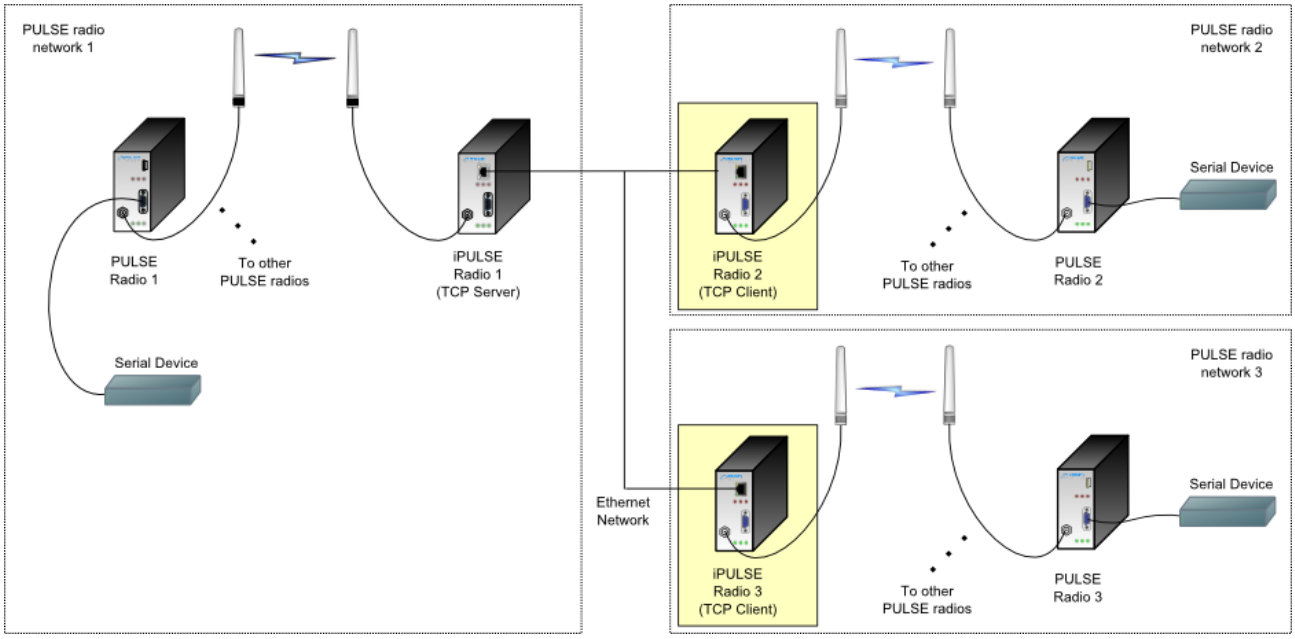
### TCP Client Mode

The TCP client/server mode is used to bridge two or more PULSE radio networks together. This allows serial devices from different PULSE networks to talk to each other via an Ethernet network.

The following diagram shows a typical context in which iPULSE radios configured as TCP Clients are used.




In this scenario, the radios configured as TCP client radios (iPULSE radio 2 and iPULSE radio 3) establish a connection to the radio configured as a TCP Server (iPULSE radio 1) when data is received from their respective PULSE radio networks. When the connection is established, any data received from the client PULSE radio networks is passed on to the TCP Server, that forwards the data to PULSE radio network 1.

Note that in this scenario, it is not possible for a serial device in PULSE radio network 2 to communicate with a serial device in PULSE radio network 3 (and vice-versa).

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The following table describes the settings associated with the TCP Client mode.

| Field Name | Description |
|---|---|
| Remote server IP | Enter the IP address of the TCP Server to which data received from the client PULSE radio network will be sent.<br>This is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br>192.168.0.1 |
| Remote server port | Enter the TCP port to which the data received from the client PULSE radio network will be sent.<br>Set this value to the **Listening port** setting of the TCP Server radio.<br>The default server port is 20011. |
| Out-connection timeout | Enter the maximum amount of time, in seconds, to keep the connection active while it is idle (no data is being transferred). If this timeout is exceeded, the connection is dropped.<br>The default in-connection timeout is 60 seconds. |

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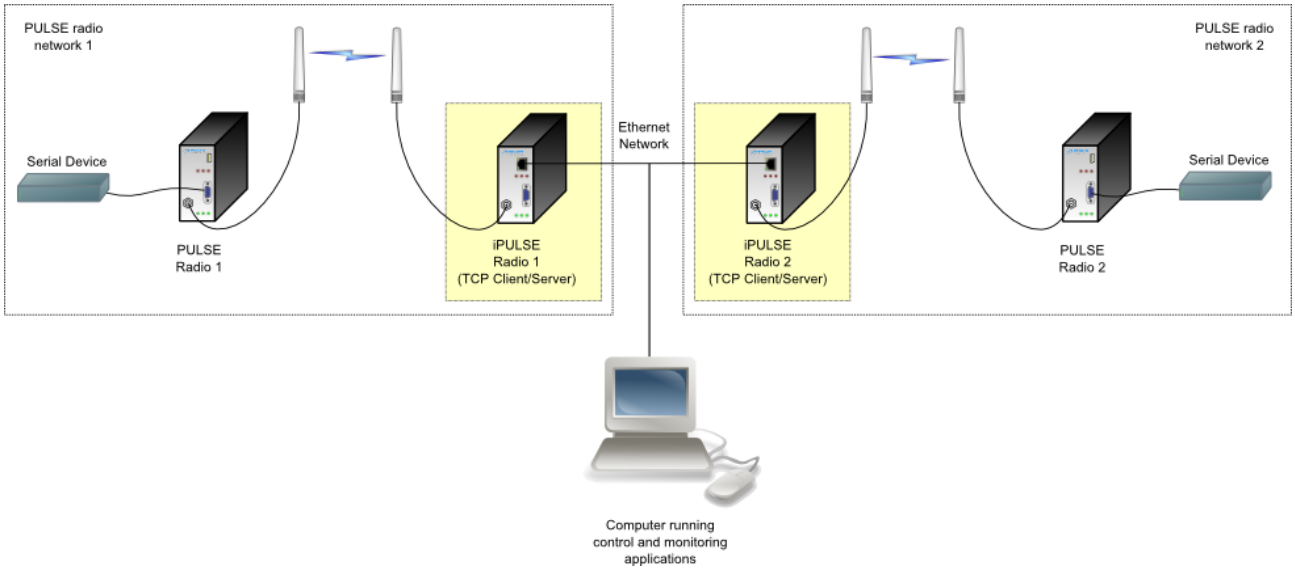
**TCP Client & Server Mode**

The TCP client/server mode is used to bridge two PULSE radio networks together. This allows serial devices from different PULSE networks to talk to each other via an Ethernet network. A semi-persistent TCP connection is established between two client/server radios that provides an efficient mechanism for transferring large quantities of data.

The following diagram shows a typical context in which two iPULSE radios configured in TCP Client/Server mode are used.




In this scenario, either of the TCP Client/Server radios can establish a connection to the other radio when data is received from their respective PULSE radio networks. When a connection is established, any data received by either of the iPULSE radios is passed on to the other radio. A serial device from either PULSE network can communicate with a serial device from the other PULSE network. As well, applications running on a computer that is connected to the Ethernet network can access all of the serial devices in the two PULSE networks.

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The following table describes the settings associated with the TCP Client/Server mode.

| Field Name | Description |
|---|---|
| Remote server IP | Enter the IP address of the other TCP Client/Server radio.<br>The is an Internet Protocol version 4 (IPv4) address, specified in dotted notation, as shown in the following example:<br>192.168.0.1 |
| Remote server port | Enter the TCP port to which the data received from the associated PULSE radio network will be sent.<br>Set this value to the **Listening port** setting of the other TCP Client/Server radio.<br>The default server port is 20011. |
| Out-connection timeout | Enter the maximum amount of time, in seconds, to keep the connection initiated by this radio active while it is idle (no data is being transferred). If this timeout is exceeded, the connection is dropped.<br>The default in-connection timeout is 60 seconds. |
| Listening port | Enter the TCP port on which the radio will listen for incoming connection requests from the other radio.<br>The default listening port is 20011. |
| In-connection timeout | Enter the maximum amount of time, in seconds, to keep the connection initiated by the other radio active while it is idle (no data is being transferred). If this timeout is exceeded, the connection is dropped.<br>The default in-connection timeout is 300 seconds. |

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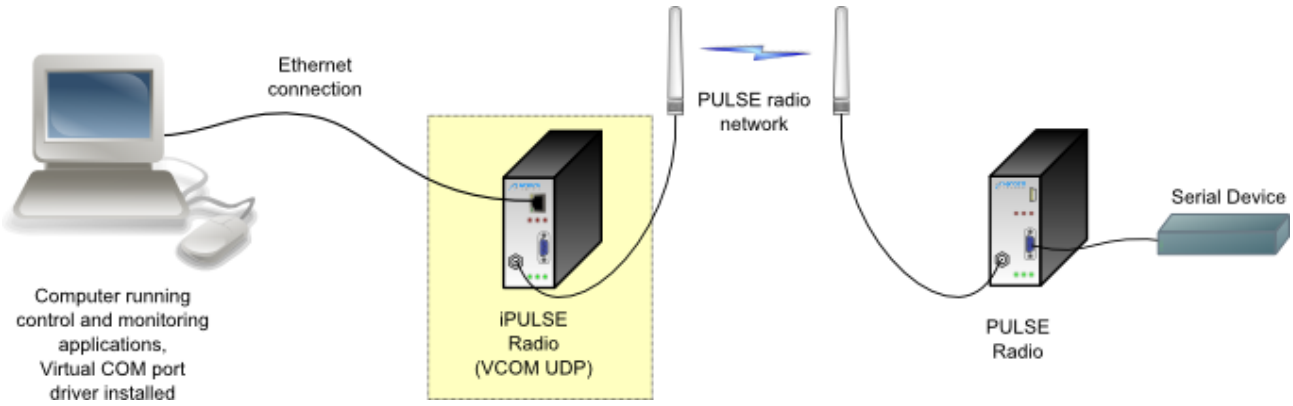
### VCOM UDP Mode

The VCOM UDP mode allows a control or monitoring application that normally requires a physical serial port to communicate with the radio network using an Ethernet cable.

The following diagram shows a typical context in which an iPULSE radio configured in VCOM UDP mode is used.


Ethernet connection
PULSE radio network
Serial Device
Computer running control and monitoring applications, Virtual COM port driver installed
iPULSE Radio (VCOM UDP)
PULSE Radio

In this scenario, a virtual COM port driver is used to create a virtual COM port that looks like a local, physical COM port to the application running on the computer. The virtual COM port is configured to send data to the iPULSE radio at a specific IP address, and to a specific UDP port. Any data sent by the application to the virtual COM port is automatically passed on to the PULSE radio network by the iPULSE radio. Conversely, any data received from the PULSE radio network is forwarded to the virtual COM port by the iPULSE radio.

The following table describes the settings associated with the VCOM UDP mode.

| Field Name | Description |
|---|---|
| UDP listening port | Enter the UDP port on which the iPULSE radio will listen for incoming data from the virtual COM port driver.<br>Data received from the PULSE radio network will be sent to the virtual COM driver on the same port number specified by the **UDP listening port** setting (i.e. the virtual COM port driver will be listening on the same port that the iPULSE radio is listening on).<br>The default listening port is 2101. |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### Serial Port Tab

The *Serial Port* tab allows you to modify the radio's controller port settings.

Due to differences in the physical interface, radios that have an FSK interface will have different port settings than radios that have an RS-232 style interface.

Refer to the following topics for more information on the port settings of the radio your are using:

- FSK Radio Settings
- RS-232 Radio Settings
- iPULSE Radio Settings

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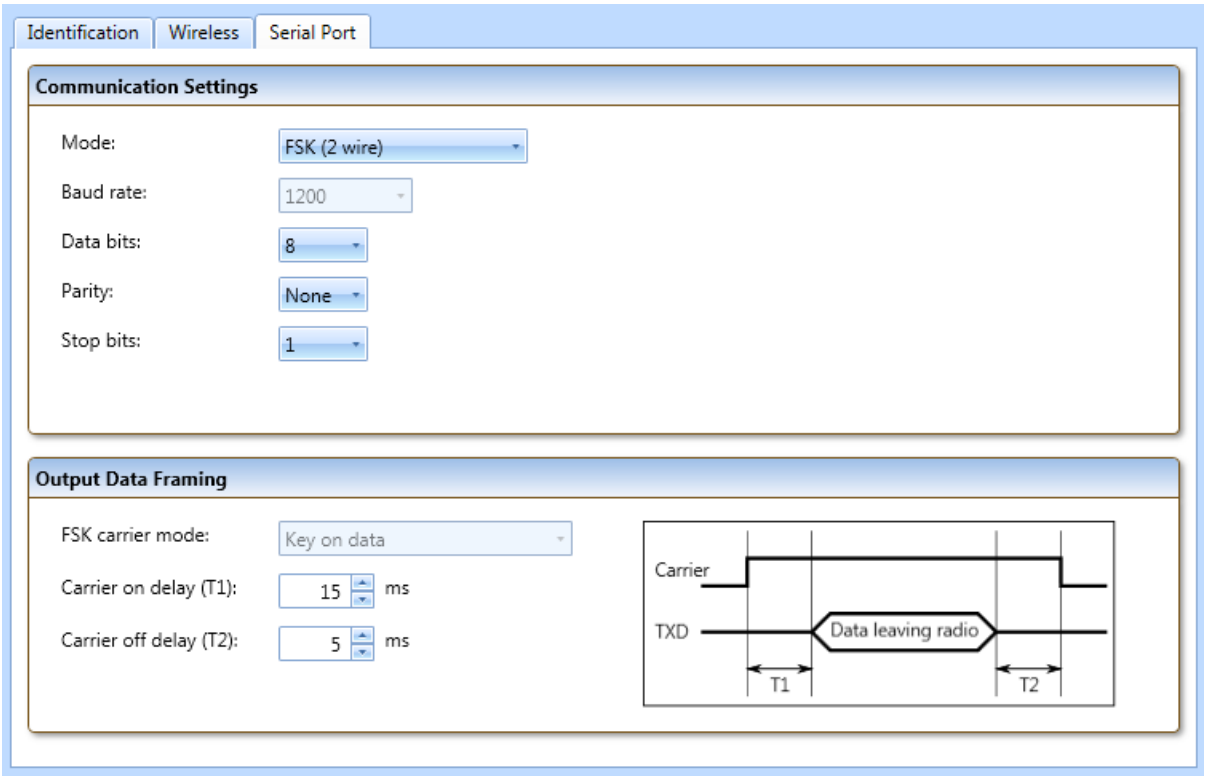
### FSK Radio Serial Port Settings

The following screen shot shows the contents of the *Serial Port* tab for a radio with an FSK interface.




The following tables describe the settings found in each group in the *Serial Port* tab.

| Communication Settings | |
|---|---|
| **Field Name** | **Description** |
| Mode | The mode in which the physical port operates. One of the following options can be used: |

| Mode | Description |
|---|---|
| FSK (2 wire) | A single pair of wires is used for both transmitting and receiving characters.<br><br>Supports half-duplex operation. |
| FSK (4 wire) | One pair of wires is used to transmit, and another pair of wires is used to receive. |

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| | |
|---|---|
| | <table><tr><td></td><td>Supports full-duplex operation.</td></tr></table> |
| Baud rate | The signaling rate to use when communicating with the device attached to the FSK connector. FSK radios are limited to 1200 baud. |
| Data bits | The number of data bits to use when communicating with the device attached to the FSK connector. |
| Parity | The type of parity to use when communicating with the device attached to the FSK connector. |
| Stop Bits | The number of stop bits to use when communicating with the device attached to the FSK connector. |

## Output Data Framing

| Field Name | Description |
|---|---|
| FSK carrier mode | This option controls the data output to the device attached to the FSK connector.<br><table><tr><th>Mode</th><th>Description</th></tr><tr><td>Key on data</td><td>The carrier is only turned on when data is being transmitted to the device attached to the FSK connector.<br>The **Carrier on delay (T1)** and **Carrier off delay (T2)** times are used to frame the data being transmitted.</td></tr><tr><td>Continuous key</td><td>The carrier is always on.<br>This option is only available when the port mode is set to **FSK (4 wire).**</td></tr></table> |
| Carrier on delay (T1) | The amount of time, in milliseconds, to wait before transmitting data (after the carrier is turned on). |
| Carrier off delay (T2) | The amount of time, in milliseconds, to wait before turning off the carrier (after the last character has been transmitted). |


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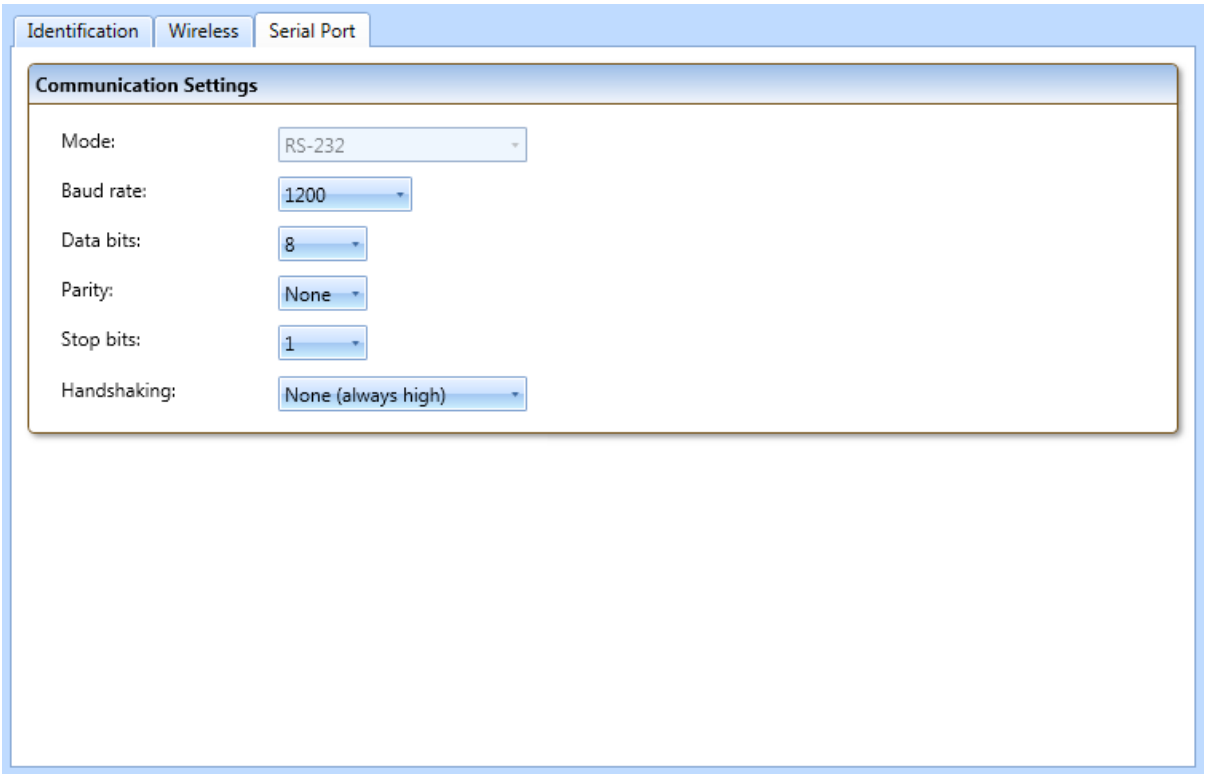
### RS-232 Radio Serial Port Settings

The following screen shot shows the contents of the *Serial Port* tab for a radio with an RS-232 interface.




The following tables describe the settings found in each group in the *Serial Port* tab.

| Communication Settings | |
|---|---|
| **Field Name** | **Description** |
| Mode | The mode in which the physical port operates. |
| Baud rate | The signaling rate to use when communicating with the device connected to the serial port. |
| Data bits | The number of data bits to use when communicating with the device connected to the serial port. |
| Parity | The type of parity to use when communicating with the device connected to the serial port. |
| Stop Bits | The number of stop bits to use when communicating with the device connected to the serial port. |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<table>
<tr>
<td>Handshaking</td>
<td>The type of handshaking to use when communicating with the device connected to the serial port.
<table>
<tr><th>Handshaking</th><th>Description</th></tr>
<tr><td>None (always high)</td><td>No handshaking is used. The radio's CTS line is always asserted.</td></tr>
<tr><td>Hardware</td><td>Standard RTS/CTS handshaking is used.</td></tr>
<tr><td>RTS/CTS input framing</td><td>The radio transmits data only when the radio's RTS line is asserted.</td></tr>
</table>
</td>
</tr>
</table>

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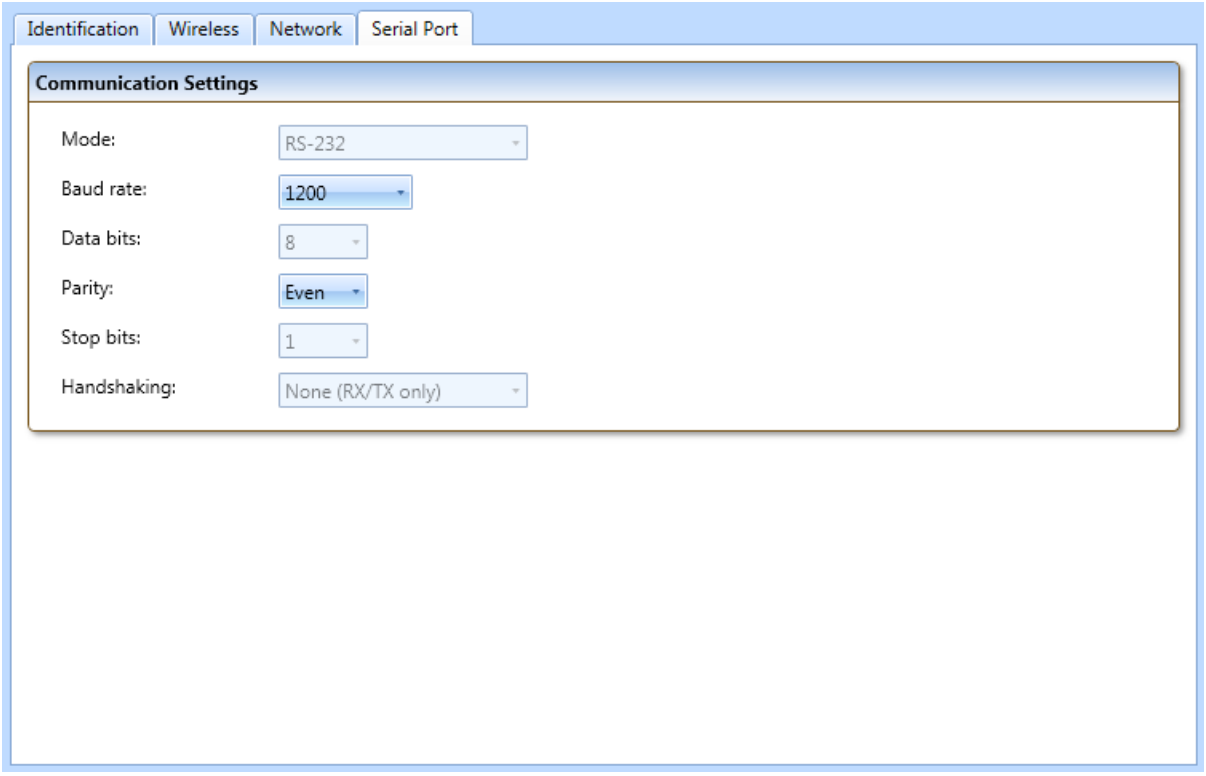
### iPULSE Radio Serial Port Settings

The following screen shot shows the contents of the *Serial Port* tab for an iPULSE radio.




The following tables describe the settings found in each group in the *Serial Port* tab.

| Communication Settings | |
|---|---|
| **Field Name** | **Description** |
| Mode | The mode in which the physical port operates. |
| Baud rate | The signaling rate to use when communicating with the device connected to the serial port. |
| Data bits | The number of data bits to use when communicating with the device connected to the serial port.<br>iPULSE radios only support 8 data bits. |
| Parity | The type of parity to use when communicating with the device connected to the serial port. |
| Stop Bits | The number of stop bits to use when communicating with the device connected to the serial port. |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| | |
|---|---|
| | If the **Parity** setting is set to **None**, 1 or 2 stop bits can be specified.<br>If the **Parity** setting is set to **Odd** or **Even**, only 1 stop bit is available. |
| Handshaking | The type of handshaking to use when communicating with the device connected to the serial port.<br>iPULSE radios don't support handshaking. Only the RX and TX lines are connected to the serial port. |

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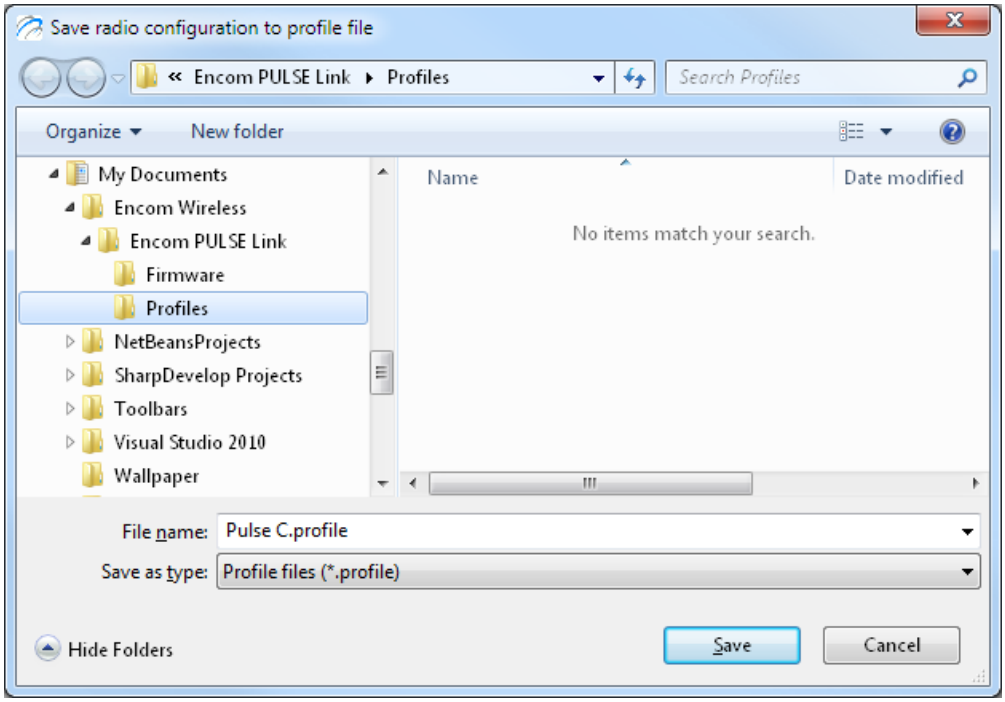
### Export Button

The **Export** function is used to save the radio settings to a configuration profile file. This allows you to:

- Make a backup copy of the radio's configuration.
- Save the radio's configuration to a profile file for use as a template in configuring other radios.

To export a radio's configuration:

1. Click on the **Export** button at the bottom of the **Settings** panel. The *Save radio configuration to profile file* form is displayed:




2. Specify the name of the file you want to save the radio's configuration settings to, and then click **Save** to save the settings.

   By default, ENCOM PULSE Link saves configuration profile files in the *'My Documents\Encom Wireless\Encom PULSE Link\Profiles'* folder.

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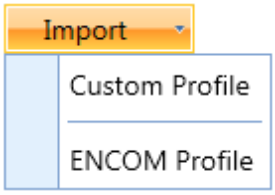
### Import Button

The **Import** function allows you to update the radio's settings from a previously saved configuration profile file. This function allows you to:

- Restore the radio's configuration from a backup file. This can be useful when you have to replace a radio in the field.
- Apply the settings from one radio to another. This can be used to provision new radios quickly, and ensure that they are compatible with other radios in the network.

To configure a radio using a saved profile file:

1. Click on the **Import** button at the bottom of the **Settings** panel. The following menu is displayed:




The **Custom Profile** item allows you to choose a profile file that you created using the Export button.

The **ENCOM Profile** item allows you to choose from a list of configuration profiles provided by ENCOM. These profiles are typically used to facilitate communication with specific traffic controllers.

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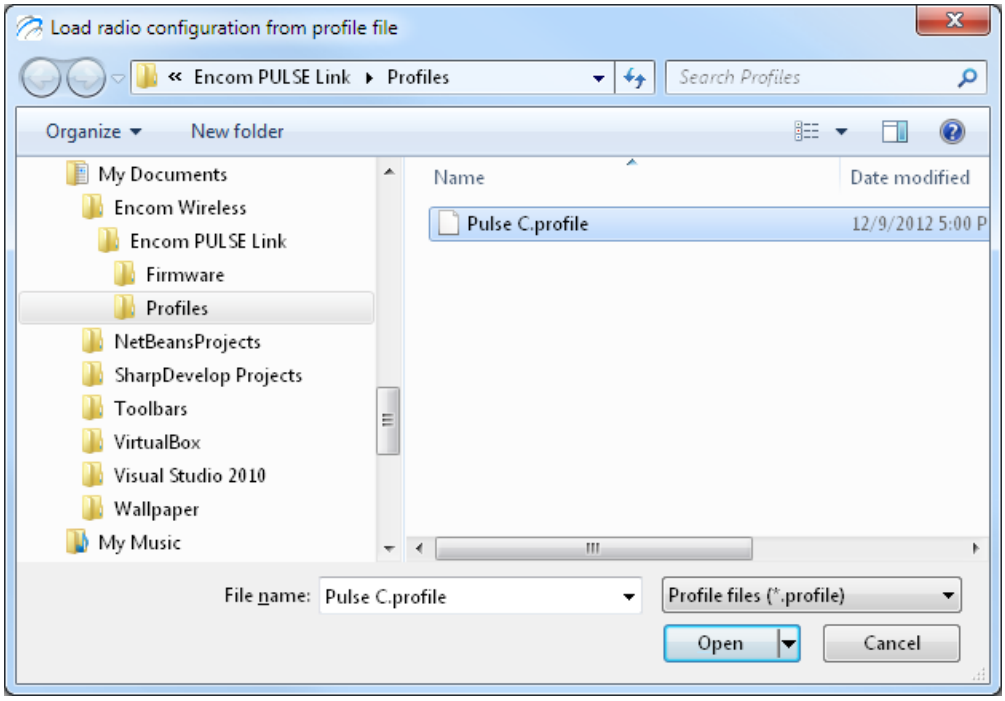
2. After selecting the **Standard** or **ENCOM** profile option, the *Load radio configuration from profile file* form is displayed:




3. Select the configuration profile you want to import, and click **Open**.

4. The radio settings will be updated to reflect the contents of the profile file.

5. Note that importing the profile will only update the settings in the PULSE Link Settings panel. To update the radio, you must save the configuration to the radio using the Save button.

| | |
|---|---|
| **NOTE** | You can only import profiles that were exported from a radio that is of the same family as the radio you are importing into.<br><br>In other words, you can only import a PULSE radio profile into a PULSE radio, and an iPULSE radio profile into an iPULSE radio. |

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### Save Button

The **Save** function allows you to save changes you have made to the radio's settings.

To save the changes:

1. Click on the **Save** button at the bottom of the **Settings** panel.
2. The Status Panel will indicate that the settings are being saved to the radio.

3. After the settings has been saved, the application will go back to the idle state.

### Reset Button

The **Reset** function allows you to reset any changes you have made in the **Settings** panel.

To reset the changes:

1. Click on the **Reset** button at the bottom of the **Settings** panel.
2. The content of the **Settings** panel will be reset to reflect the radio's current configuration.

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## Signal Strength Panel

The *Signal Strength* panel allows you to monitor the received signal strengths between two radios. It can also be used to adjust the output power of the radios, allowing you to pick the optimum balance between power consumption and wireless connection reliability.

The following screen shot shows the *Signal Strength* panel.

Refer to the following topics for information on the *Signal Strength* panel.

- Signal Strength Toolbar
- Signal Strength Meter
- Using the Signal Strength Panel

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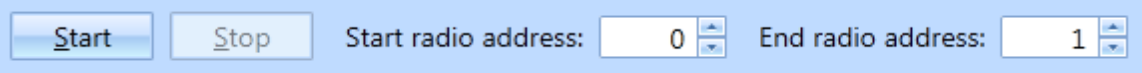
### Signal Strength Toolbar

The *Signal Strength* toolbar allows you to manage a signal strength monitoring session.




The following table describes the items found in the *Signal Strength* toolbar:

| Item Name | Description |
|---|---|
| Start | Click the **Start** button to start a signal strength monitoring session. |
| Stop | Click the **Stop** button to stop an active signal strength monitoring session. |
| Start radio address | Specify the **Unit Address** of the first radio to monitor.<br>The **Unit Address** is configured in the Wireless tab of the Settings panel. |
| End radio address | Specify the **Unit Address** of the second radio to monitor. In order for the results to be meaningful, the end radio should be in direct communication with the start radio (i.e. there is no repeater between the two radios). |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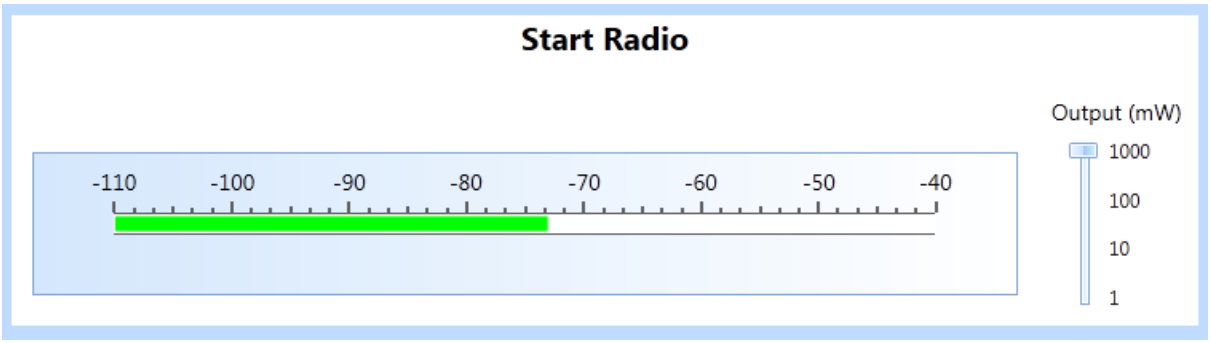
### Signal Strength Meter

The following screen shot shows an individual signal strength meter.




The following table describes the components of the signal strength meter.

| Item Name | Description |
|---|---|
| Title | Indicates the radio that is being monitored.<br>The **Start Radio** meter will show the signal strength of the signal received from the end radio.<br>The **End Radio** meter will show the signal strength of the signal received from the start radio. |
| Meter | The meter shows the current received signal strength in dBm (the power ratio in decibels referenced to one milliwatt). |
| Output (mW) | Shows the current power level setting of the associated radio.<br>You can use the slider to change the power level of the radio. A change in the start radio's power level will affect the received signal strength of the end radio, and vice versa.<br>For best results, you should adjust the output power levels so that both of the radios are showing a signal strength value between -40 and -90 dBm. |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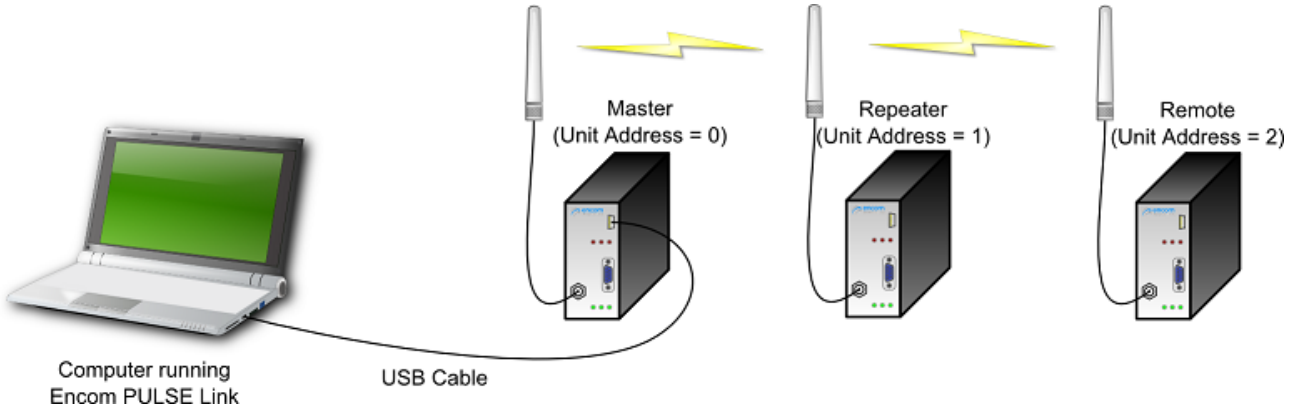
### Using the Signal Strength Panel

The following diagram shows a typical radio network. A repeater is being used between the master and remote radios because the distance between the master and the remote is too great for a reliable connection.




The three radios have been provisioned with the settings shown in the following table.

| Radio | Setting | Value |
|---|---|---|
| Master | Primary hop pattern | 0 |
| | Network address | 0 |
| | Unit address | 0 |
| | Security key | 0 |
| Repeater | Primary hop pattern | 0 |
| | Repeater hop pattern | 1 |
| | Network address | 0 |
| | Unit address | 1 |
| | Security key | 0 |
| Remote | Primary hop pattern | 1 |
| | Network address | 0 |
| | Unit address | 2 |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| | | |
|---|---|---|
| | Security key | 0 |

The computer running PULSE Link is connected to the master radio.

To verify the signal strength between the radios, you would run two tests:

| Test | Start radio address | End radio address |
|---|---|---|
| Master to Repeater | 0 | 1 |
| Repeater to Remote | 1 | 2 |

There is no reason to test the signal strength between the master and the remote, since they are not directly connected.

In both cases, try to adjust the output power level of each radio so that the received signal strength for the other radio is between -40 and -90 dBm.

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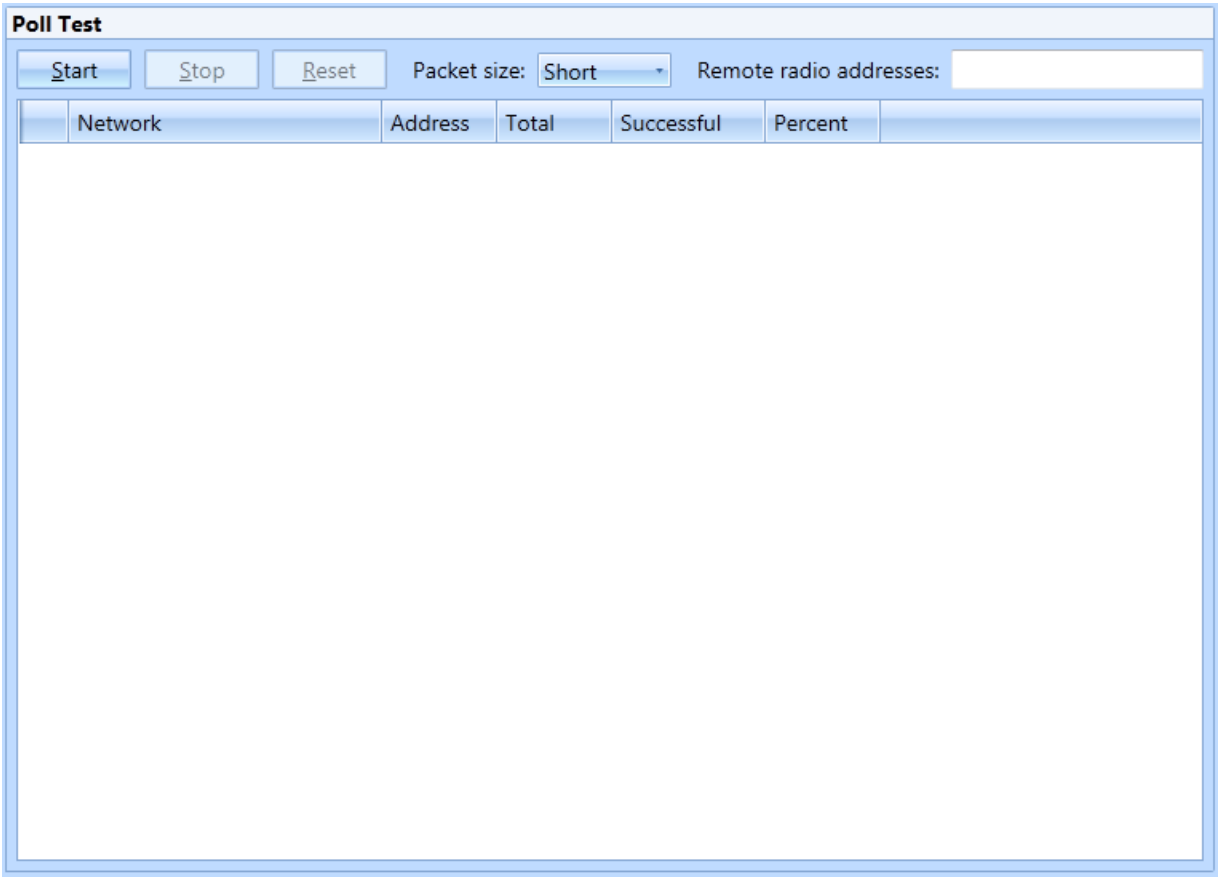
## Poll Test Panel

The *Poll Test* panel allows you to verify the reliability of the network by periodically sending packets from the master to one or more radios in the network and verifying that the packets were received by the radios.

The following screen shot shows the *Poll Test* panel.




Refer to the following topics for information on the *Poll Test* panel.

- Poll Test Toolbar
- Poll Test Report

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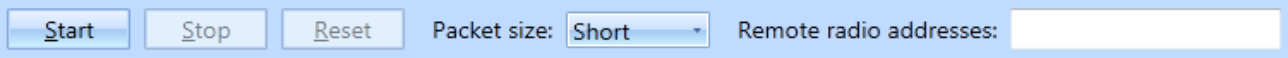
### Poll Test Toolbar

The *Poll Test* toolbar allows you to manage a poll test session.




The following table describes the items found in the *Poll Test* toolbar:

| Item Name | Description |
|---|---|
| Start | Click the **Start** button to start a poll test session. |
| Stop | Click the **Stop** button to stop an active poll test session. |
| Reset | Click the **Reset** button to reset the statistics during a poll test session. |
| Packet size | Set the size of the packets that will be sent to the radios from the master. On of the following options can be selected.<br>**Option** / **Packet Size**<br>Short / 3 bytes<br>Medium / 64 bytes<br>Long / 128 bytes |
| Remote radio addresses | Specify one or more **Unit Addresses** to identify the radios that are to participate in the poll test. You can specify the addresses in a number of ways.<br>**Format** / **Example**<br>Single address / 1<br>Multiple addresses separated by commas / 1,2,4<br>Single range of addresses / 1-4<br>Multiple ranges separated by commas / 1-4,6-8 |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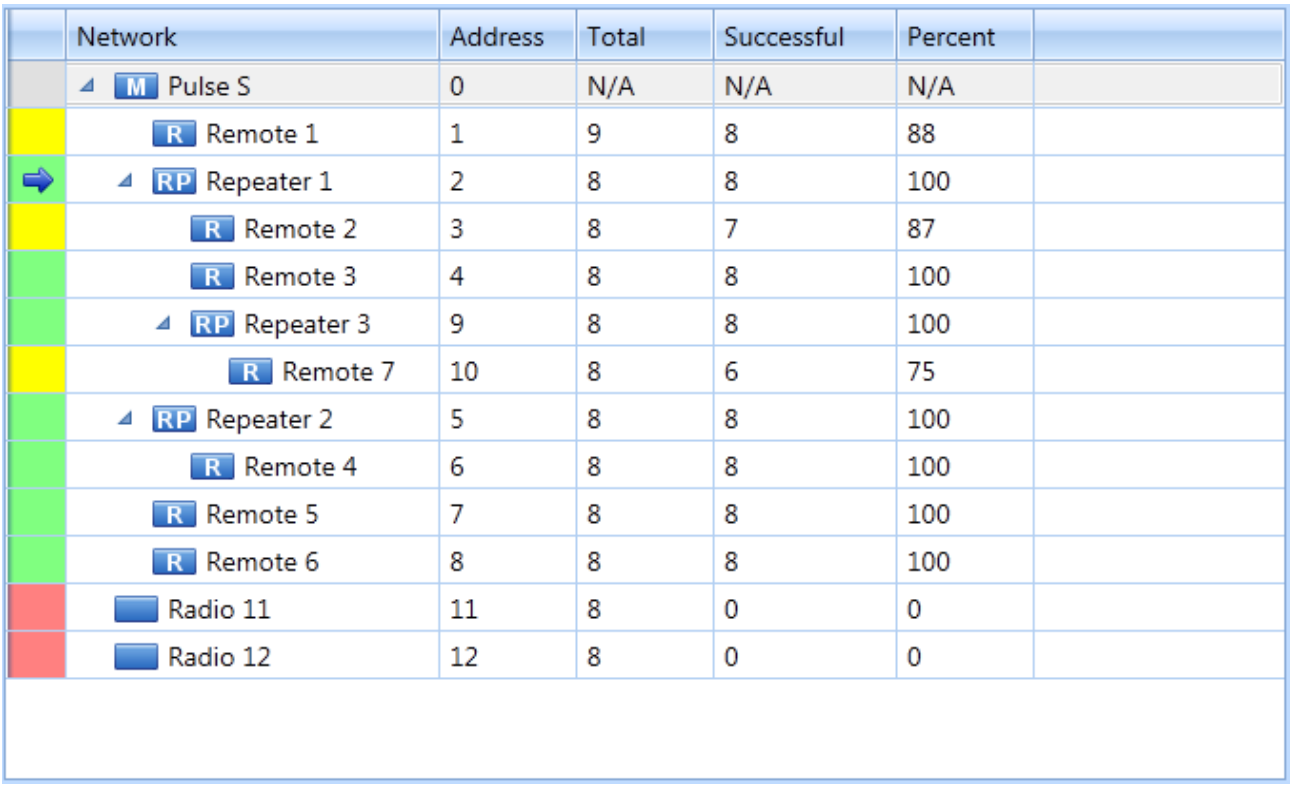
### Poll Test Report

The poll test report area displays the results of the poll test. The following screen shot shows a typical poll test report:



| Network | Address | Total | Successful | Percent |
|---|---|---|---|---|
| M Pulse S | 0 | N/A | N/A | N/A |
| R Remote 1 | 1 | 9 | 8 | 88 |
| RP Repeater 1 | 2 | 8 | 8 | 100 |
| R Remote 2 | 3 | 8 | 7 | 87 |
| R Remote 3 | 4 | 8 | 8 | 100 |
| RP Repeater 3 | 9 | 8 | 8 | 100 |
| R Remote 7 | 10 | 8 | 6 | 75 |
| RP Repeater 2 | 5 | 8 | 8 | 100 |
| R Remote 4 | 6 | 8 | 8 | 100 |
| R Remote 5 | 7 | 8 | 8 | 100 |
| R Remote 6 | 8 | 8 | 8 | 100 |
| Radio 11 | 11 | 8 | 0 | 0 |
| Radio 12 | 12 | 8 | 0 | 0 |

The following table describes the columns of the poll test report.

<table>
<tr><th>Column Name</th><th>Description</th></tr>
<tr><td>State</td><td>The state column shows the current state of the poll test for the associated radio. The following table describes the colors used:
<table>
<tr><th>Color</th><th>State</th></tr>
<tr><td></td><td>The radio has not yet been polled.<br>The master radio's state is always gray, since it is not polled (as it is actually doing the polling).</td></tr>
<tr><td></td><td>The radio has responded at least 90% of the poll messages sent to it.</td></tr>
<tr><td></td><td>The radio has responded to at least 70%, but less than 90%, of the poll messages sent to it. The issues that are causing the poll failures should be addressed.</td></tr>
</table>
</td></tr>
</table>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| | |
|---|---|
| | <table><tr><td></td><td>The radio has responded to less than 70% of the poll messages sent to it. The issues that are causing the poll failures should definitely be addressed.</td></tr></table><br>The arrow indicator, ➡, shows the radio that is currently being polled. |
| Network | This column displays the network topology of the radios that are participating in the poll test.<br><br>When the poll test is first started, all radios are displayed at the same level in the network column:<br><br> <br><br>As the radios respond to their polls, ENCOM PULSE Link is able to determine their names, operating modes, and the radios to which they report. The radio icons and names are updated, and the radios are automatically moved to the appropriate location within the network diagram: |

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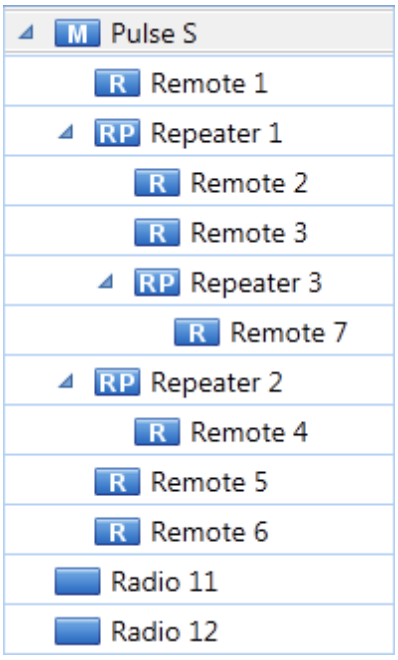
<table>
<tr><td></td><td>


<br>The following table describes the icons shown in the Network column:
<table>
<tr><th>Icon</th><th>Description</th></tr>
<tr><td> </td><td>The radio is a master.</td></tr>
<tr><td> </td><td>The radio is a remote.</td></tr>
<tr><td> </td><td>The radio is a repeater.</td></tr>
<tr><td> </td><td>The radio has not yet responded to the poll test.</td></tr>
</table>
</td></tr>
<tr><td>Address</td><td>The radio's unit address.</td></tr>
<tr><td>Total</td><td>The total number of packets sent to the radio during the poll test session.</td></tr>
<tr><td>Successful</td><td>The number of packets to which the radio responded.</td></tr>
<tr><td>Percent</td><td>The percentage of packets to which the radio responded.</td></tr>
</table>

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## Spectrum Scan Panel

The *Spectrum Scan* panel allows you to determine the amount of 900 MHz traffic that is in the vicinity of the radio.

The following screen shot shows the *Spectrum Scan* panel.

The spectrum scan function is useful for site surveys (to determine if a location is suitable for installing a radio). If the spectrum scan indicates that there is a large quantity of 900 MHz traffic in the area, it would be wise to install the radio in a different location.

Refer to the following topics for information on the *Spectrum Scan* panel.

- Spectrum Scan Toolbar
- Spectrum Scan Graph

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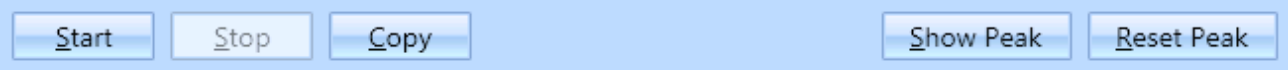
### Spectrum Scan Toolbar

The *Spectrum Scan* toolbar allows you to manage a spectrum scan session.




The following table describes the items found in the *Spectrum Scan* toolbar:

| Item Name | Description |
|---|---|
| Start | Click the **Start** button to start a spectrum scan session. |
| Stop | Click the **Stop** button to stop an active spectrum scan session. |
| Copy | Click the **Copy** button to take a snapshot of the current spectrum scan graph. The snapshot is placed in the Windows clipboard in graphical format, and can be pasted in any application that accepts bitmaps (such as Microsoft Paint, Microsoft Word, etc.). |
| Show Peak | Click the **Show Peak** button to display the aggregate of all spectrum readings obtained from the radio. This is shown in light blue in the Spectrum Scan graph.<br>Click the **Show Peak** button again to hide the aggregate spectrum reading. |
| Reset Peak | Click the **Reset Peak** button to clear the aggregate spectrum reading. |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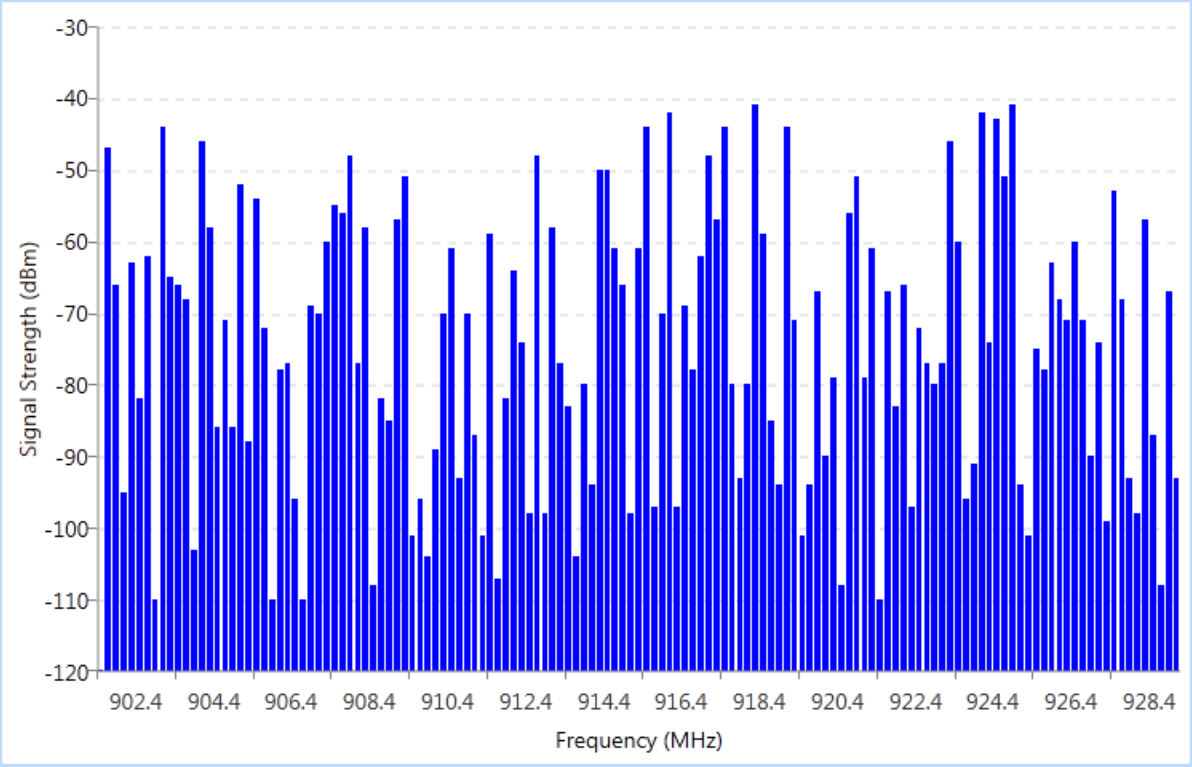
### Spectrum Scan Graph

The *Spectrum Scan* graph shows the result of the spectrum scan carried out by the radio.

When a spectrum scan session is active, the radio is continuously polled for information regarding the 900 MHz traffic that is in the vicinity of the radio. Blue bars in the graph are periodically updated to show the current traffic encountered by the radio.

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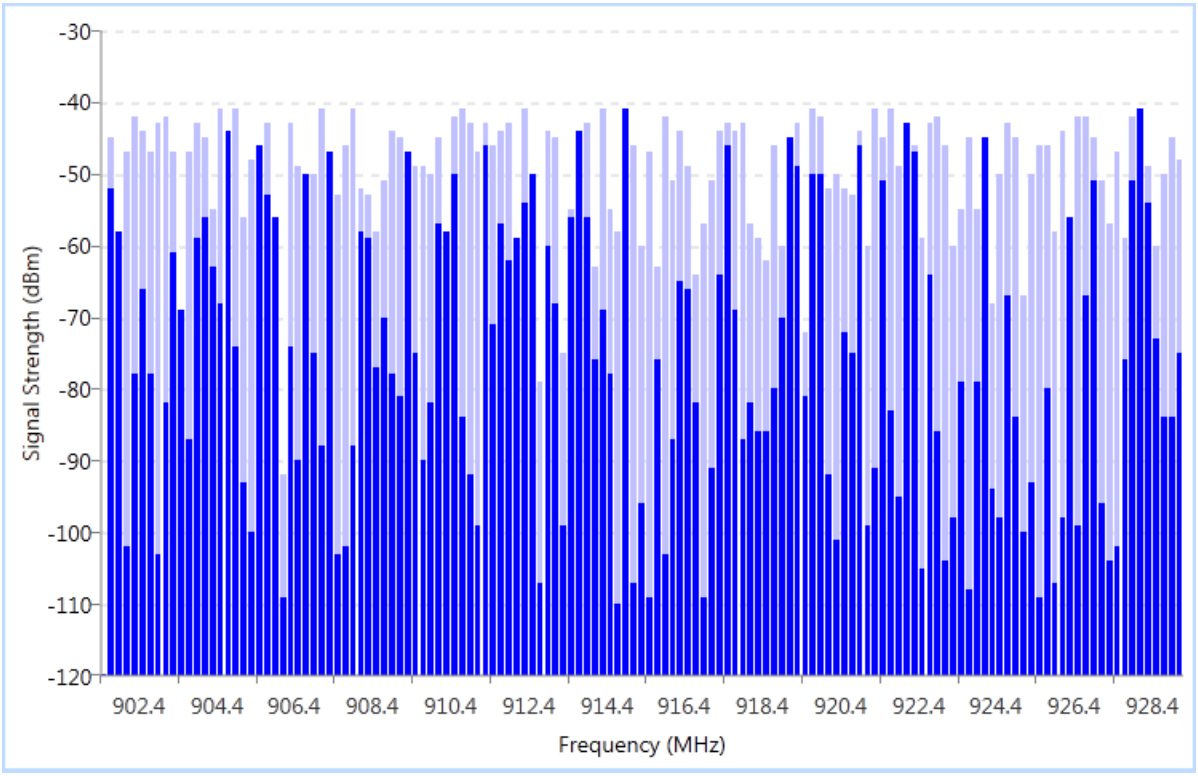
If the Peak Hold button is active, the graph will show the aggregate of all spectrum readings obtained from the radio in light blue.




**NOTE**

The example shows a very noisy environment. You should avoid locating the radio in places where there is continuous activity across the 900 MHz spectrum. It is okay if the background activity is sporadic, or is clustered in a small range of the spectrum. It is also okay if the background activity is very low level (less than -90 dBm).

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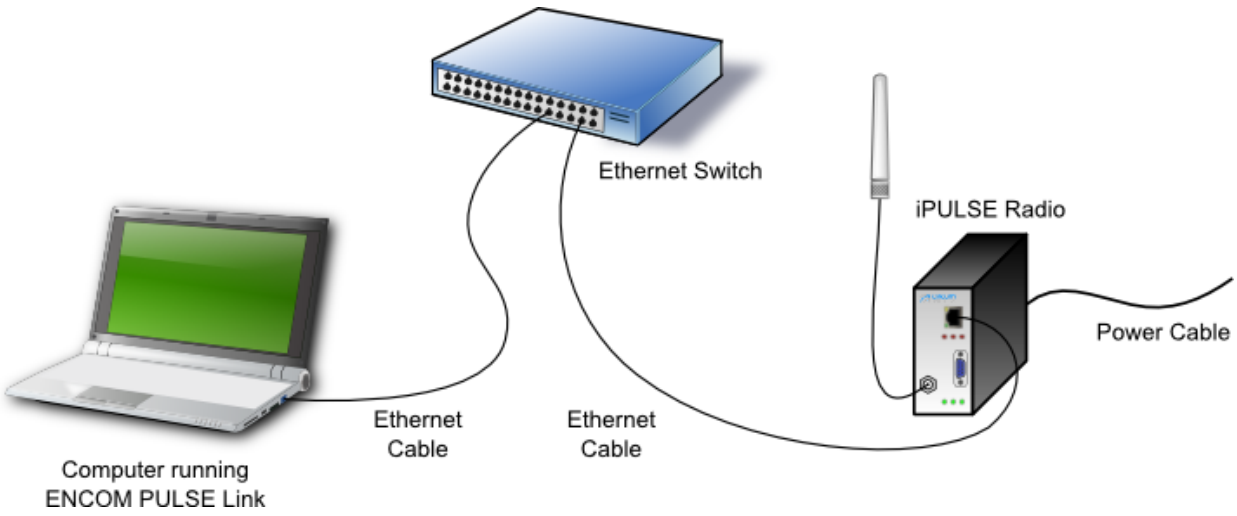
## iPULSE Radios Form

The *iPULSE Radios* form allows you to connect to and manage your iPULSE radios.

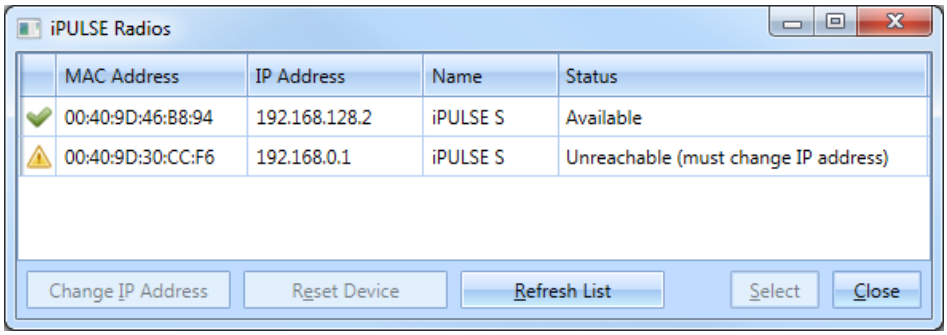
To manage an iPULSE radio:

1. Run the ENCOM PULSE Link application on your computer.
2. Power the iPULSE radio with the provided wall mount power adapter, and then connect it to your computer using an Ethernet cable.




3. Click the **Search for iPULSE radios** button at the left of the status bar.

4. The *iPULSE Radios* form is displayed.




While this form is visible, PULSE Link is actively searching for iPULSE radios. It will detect and list all iPULSE radios that are connected to your local network. It will **NOT** detect an iPULSE radio if there is a router between the radio and the computer running the PULSE Link application.

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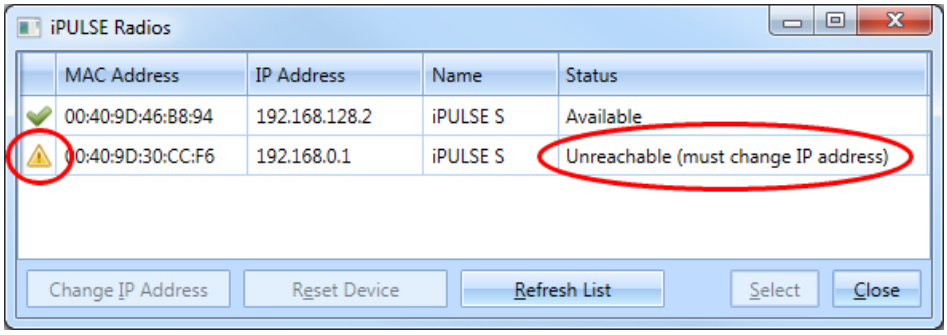
5. If you have just received your iPULSE radio from ENCOM, its default IP address may not be compatible with your local network. In this case, a ⚠ indicator is shown at the left of radio's MAC Address, and the **Status** column indicates that you must change the radio's IP address.




In order to connect to a radio that is unreachable, you will have to change it's IP address to a compatible value. Refer to the Changing the IP Address of an iPULSE Radio topic for information on changing the radio's IP address.

Refer to the following topics for more information on the functions available in the *iPULSE Radios* form:

- Changing the IP Address of an iPULSE Radio
- Resetting an iPULSE Radio
- Refreshing the iPULSE Radio List
- Viewing or Changing the Settings of an iPULSE Radio

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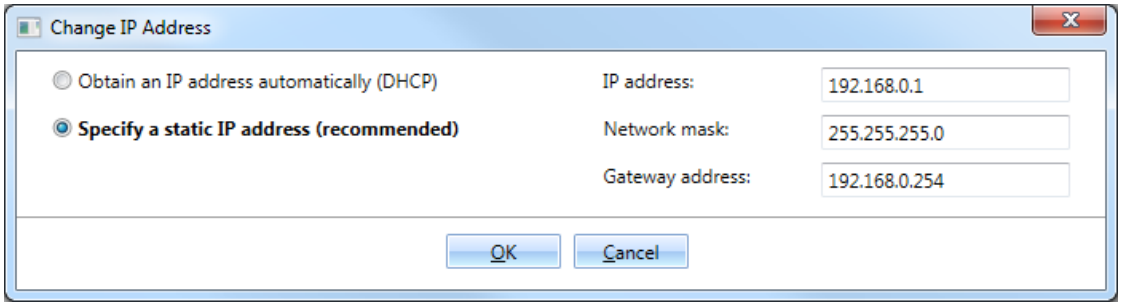
### Changing the IP Address of an iPULSE Radio

To change the address of an ENCOM iPULSE radio:

1. Select the appropriate radio in the *iPULSE Radios form*, and then click the **Change IP Address** button. The **Change IP Address** form is displayed.

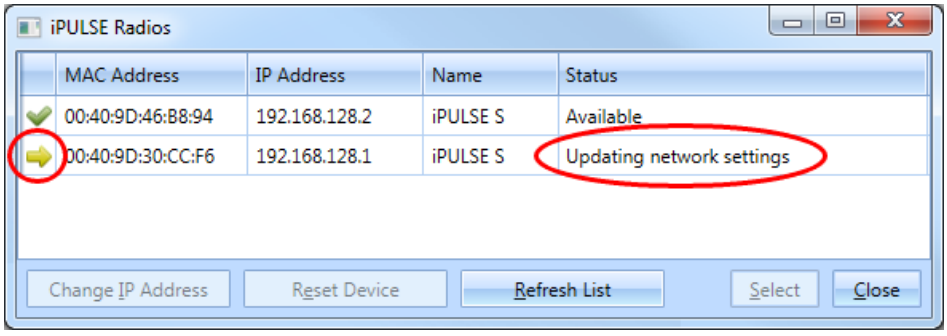



2. Enter the appropriate values in the **IP address**, **Network mask** and **Gateway address** fields, and then click the **OK** button to save the new network settings to the radio. If you are not sure what values to use, please contact your IT department for assistance.

   Alternatively, you can use DHCP to assign an IP address to the radio. Select the **Obtain an IP address automatically** option, and then click the **OK** button to save the network settings to the radio. Note that this option only works if a DHCP server is active on your local network.

   Using the DHCP option is not recommended for radios installed in the field. The IP address assigned to the radio could change, or the DHCP server could fail and become unavailable. Both of these issues could cause loss of connectivity with the radio.

3. While the IP address is being changed, a indicator is shown at the left of the radio's MAC Address, and the **Status** column indicates that the radio's network settings are being updated.

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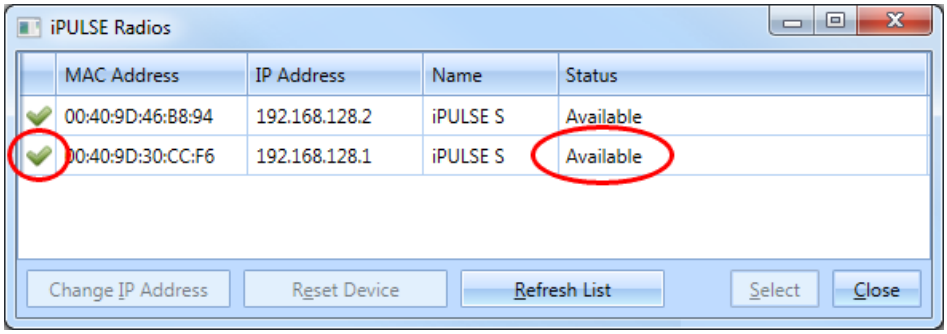
4. After the IP address has been successfully changed, the ✔ indicator is shown at the left of the radio's MAC Address, and the **Status** column indicates that the radio is available.

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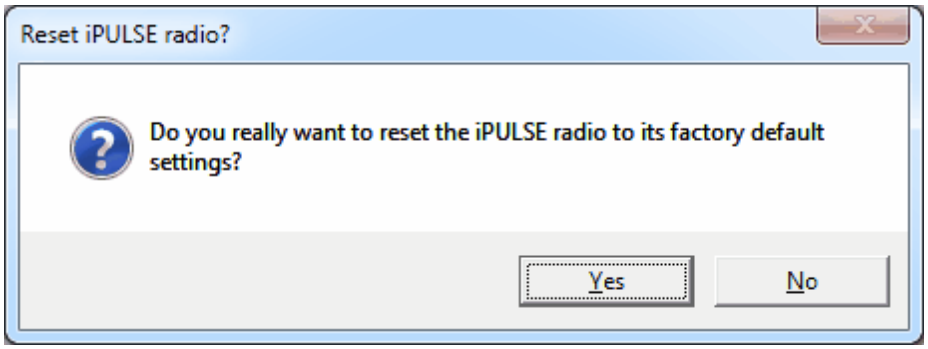
### Resettting an iPULSE Radio

Under certain circumstances, you may find that you are no longer able to communicate with an iPULSE radio. If this happens, you may be able to restore communications by resetting the radio.

To reset an ENCOM iPULSE radio:

1. Select the appropriate radio in the *iPULSE Radios form*, and then click the **Reset Device** button. You will be prompted for permission to reset the radio:




   Click the **Yes** button to proceed.

2. While the radio is being reset, a ➡ indicator is shown at the left of the radio's MAC Address, and the **Status** column indicates that the radio is being reset.

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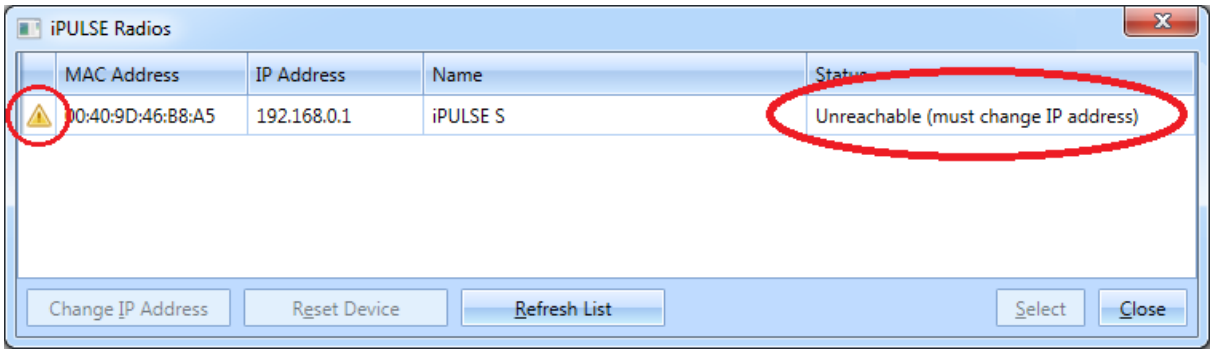
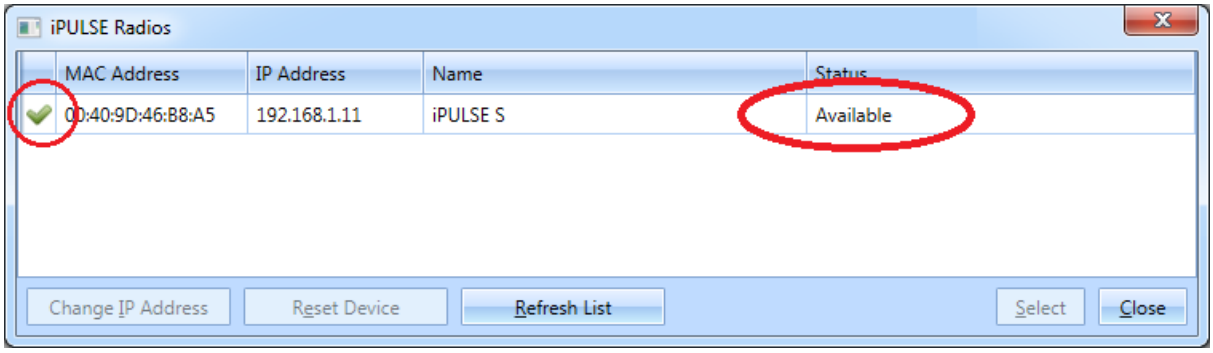
3. When a radio has been reset, its IP address is set to 192.168.0.1. If this address is not compatible with your computer's network settings, PULSE Link will not be able to communicate with the radio. In that case, a ⚠ indicator is shown at the left of the radio's MAC Address, and the **Status** column indicates that the radio is unreachable.




If this occurs, change the radio's IP address to a compatible one using the Change IP Address button.

4. If your computer's network address is compatible with the radio's IP address, the ✔ indicator is shown at the left of the radio's MAC Address, and the **Status** column indicates that the radio is available.

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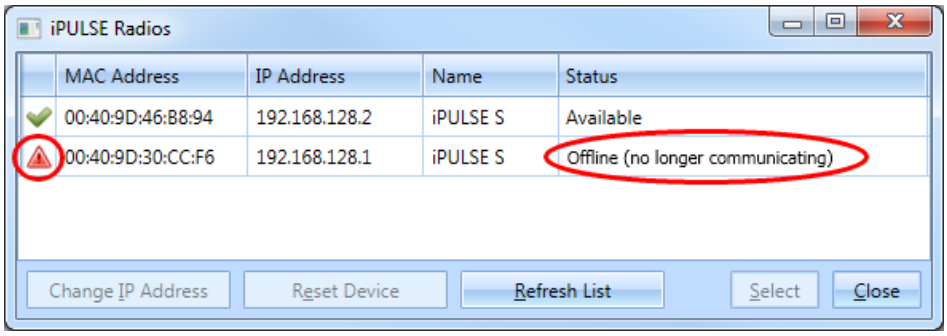
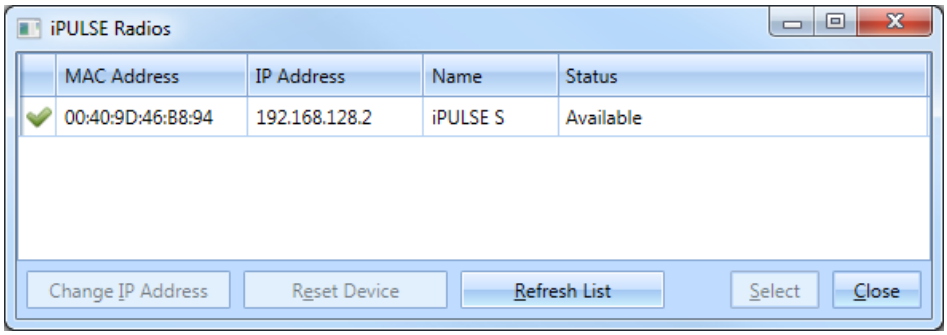
### Refreshing the iPULSE Radio List

The *iPULSE Radios form* displays the list of all iPULSE radios discovered since the form was displayed.

If you are configuring a large number of iPULSE radios for later deployment, the list can become cluttered with radios that are no longer present. When a radio is no longer present, a ⚠ indicator is shown at the left of radio's MAC Address, and the **Status** column indicates that the radio is offline.




To remove the radios that are no longer present, click the **Refresh List** button. The list is cleared, and only the radio or radios that are currently connected your computer will return to the list.




Alternatively, you could simply close and redisplay the *iPULSE Radios* form.

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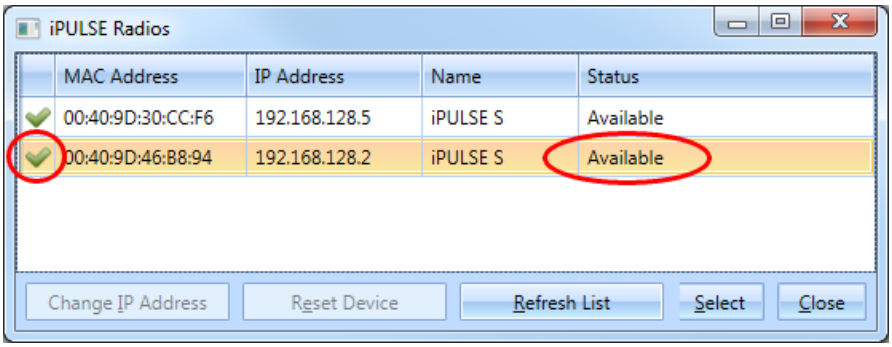
### Viewing or Changing the Settings of an iPULSE Radio

To view or change the settings of an ENCOM iPULSE radio:

1. Select a radio that is currently available in the *iPULSE Radios form*.




2. Click the **Select** button. Alternatively, you can double-click the left mouse button on the item in the radio list.

3. The status indicator will briefly display a message while the radio's configuration settings are retrieved.

Note that when the status bar is red, you should not disconnect the Ethernet cable from the radio, nor should you remove power from the radio.

4. After the radio's configuration settings have been retrieved, the radio is shown as being on-line.

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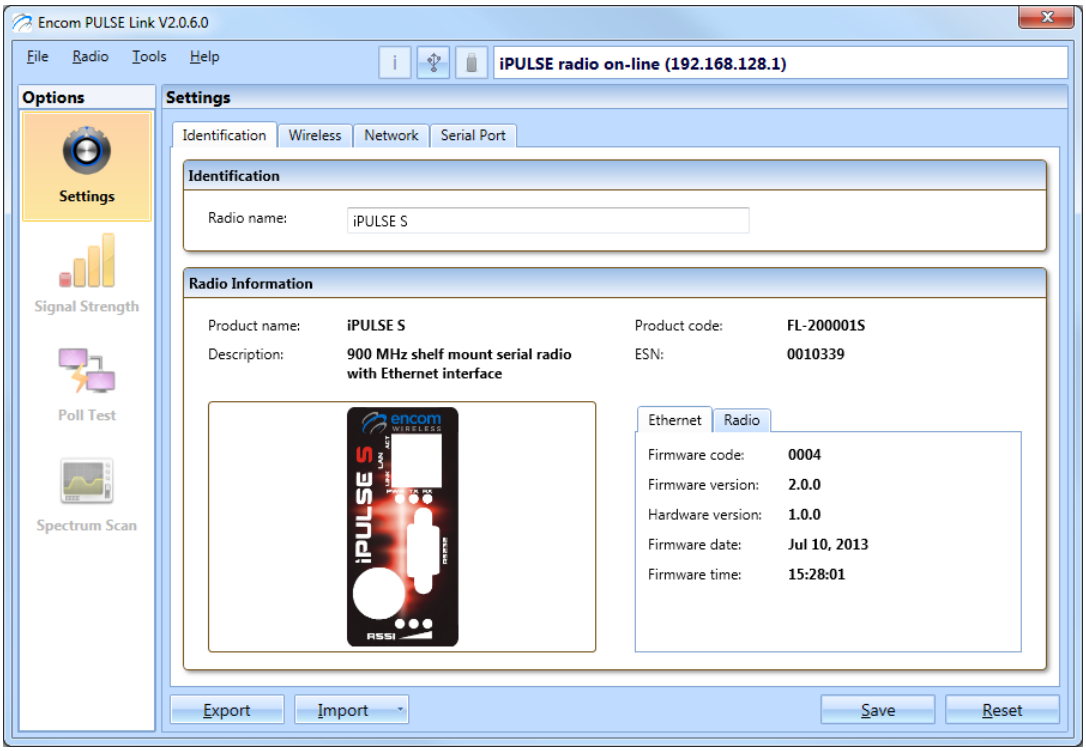
5. The radio configuration panel is displayed. At this point you can use ENCOM PULSE Link to manage your radio.

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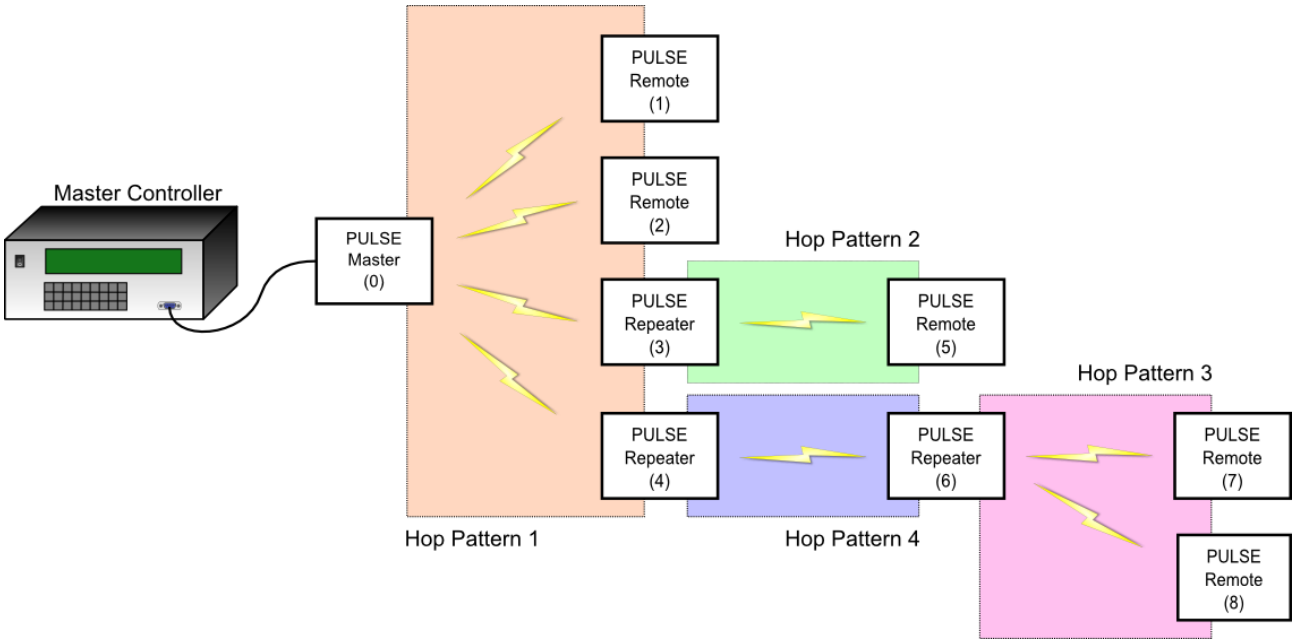
# Chapter 4: PULSE Radio Network Example

This topic describes a typical scenario where PULSE radios are used to extend the reach of a master controller.

The following diagram shows the radios found in the network:




For the sake of simplicity, only the master controller connected to the PULSE Master radio is shown. It is assumed that local controllers are connected to the remaining radios in the system.

In order for the radios to be able to communicate with each other, they following configuration parameters must be set to the same value for all radios:

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Network address | 0 |
| Wireless | Security key | 0 |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To allow the Signal Strength and Poll Test functions to work properly, each radio must be assigned a unique unit address. The PULSE Master is assigned a unit address of 0 by default. The remaining radios are assigned unique unit addresses in the range of 1 to 254. The unit addresses assigned to each radio in the diagram are shown in parentheses.

The Operating mode setting must be set according to the role of the radio in the system (master, repeater or remote).

In order to establish the proper communication links, the appropriate hop patterns need to be assigned to the radios. The following rules can be used to guide the assignment process:

- In order for two radios to communicate with each other, they must be assigned the same hop pattern.
- The master and the radios that communicate directly with it must be assigned the same **Primary** hop pattern.
- The radios that communicate directly with a repeater are assigned a **Primary** hop pattern that matches the repeater's **Repeater** hop pattern.
- If the **Primary** hop pattern for a repeater is odd, its **Repeater** hop pattern should be set to an even value, and vice-versa. (Odd and even hop patterns hop on different sets of frequencies, and will not interfere with each other.)

The colored boxes in the diagram show the hop patterns assigned to the radios. In particular:

- Radios 0, 1, 2, 3 and 4 are assigned a **Primary** hop pattern of 1
- Radio 3 is assigned a **Repeater** hop pattern of 2, and radio 5 is assigned a **Primary** hop pattern of 2
- Radio 4 is assigned a **Repeater** hop pattern of 4, and radio 6 is assigned a **Primary** hop pattern of 4
- Radio 6 is assigned a **Repeater** hop pattern of 3, and radios 7 and 8 are assigned a **Primary** hop pattern of 3

The following topics show the detailed settings for each of the radios in the example:

- PULSE Master (0) Configuration
- PULSE Remote (1) Configuration
- PULSE Remote (2) Configuration
- PULSE Repeater (3) Configuration
- PULSE Repeater (4) Configuration

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- PULSE Remote (5) Configuration
- PULSE Repeater (6) Configuration
- PULSE Remote (7) Configuration
- PULSE Remote (8) Configuration

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## PULSE Master (0) Configuration

The following table shows the configuration settings required for the PULSE Master radio. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Master |
| Wireless | Primary hop pattern | 1 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 0 |
| Wireless | Security key | 0 |


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## PULSE Remote (1) Configuration

The following table shows the configuration settings required for the PULSE Remote radio with unit address 1. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Remote |
| Wireless | Primary hop pattern | 1 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 1 |
| Wireless | Security key | 0 |

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## PULSE Remote (2) Configuration

The following table shows the configuration settings required for the PULSE Remote radio with unit address 2. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Remote |
| Wireless | Primary hop pattern | 1 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 2 |
| Wireless | Security key | 0 |


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## PULSE Repeater (3) Configuration

The following table shows the configuration settings required for the PULSE Repeater radio with unit address 3. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Repeater |
| Wireless | Primary hop pattern | 1 |
| Wireless | Repeater hop pattern | 2 |
| Wireless | Network address | 0 |
| Wireless | Unit address | 3 |
| Wireless | Security key | 0 |

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## PULSE Repeater (4) Configuration

The following table shows the configuration settings required for the PULSE Repeater radio with unit address 4. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Repeater |
| Wireless | Primary hop pattern | 1 |
| Wireless | Repeater hop pattern | 4 |
| Wireless | Network address | 0 |
| Wireless | Unit address | 4 |
| Wireless | Security key | 0 |

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## PULSE Remote (5) Configuration

The following table shows the configuration settings required for the PULSE Remote radio with unit address 5. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Remote |
| Wireless | Primary hop pattern | 2 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 5 |
| Wireless | Security key | 0 |

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## PULSE Repeater (6) Configuration

The following table shows the configuration settings required for the PULSE Repeater radio with unit address 6. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Repeater |
| Wireless | Primary hop pattern | 4 |
| Wireless | Repeater hop pattern | 3 |
| Wireless | Network address | 0 |
| Wireless | Unit address | 6 |
| Wireless | Security key | 0 |


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## PULSE Remote (7) Configuration

The following table shows the configuration settings required for the PULSE Remote radio with unit address 7. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Remote |
| Wireless | Primary hop pattern | 3 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 7 |
| Wireless | Security key | 0 |

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## PULSE Remote (8) Configuration

The following table shows the configuration settings required for the PULSE Remote radio with unit address 8. The other settings do not affect the wireless network operation, and are not discussed in this example.

| Settings Tab Name | Setting Name | Value (for this example) |
|---|---|---|
| Wireless | Repeater in system | Yes |
| Wireless | Operating Mode | Remote |
| Wireless | Primary hop pattern | 3 |
| Wireless | Repeater hop pattern | (Not used - can be set to any value) |
| Wireless | Network address | 0 |
| Wireless | Unit address | 8 |
| Wireless | Security key | 0 |

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